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READE STREET, NEW YORK. A TYPICAL WOOD BLOCK PAVED STREET

DEVELOPMENT OF WOOD BLOCK SPECIFICATIONS

History of the Use of Treated Wood Blocks in the East—Early Creo-Resinate Process—Evolution of Specifications in New York—Character of Preservative Oil—Antiseptic and Waterproofing Qualities

By GEORGE W. TILLSON, Chief Engineer of Highways, Borough of Manhattan, New York City

Probably no material for street pavements has caused as much interest over the entire country since the introduction of asphalt as have creosoted wood blocks.

In the '80's brick was introduced and a large amount of it used in the central west, but as most of the clays that will make suitable paving brick are found in that locality its use has been somewhat restricted on account of the high cost of transportation. But wood is a material that is used all over the country and can be obtained at a reasonable price.

The first creosoted wood blocks were laid in Indianapolis about twelve years ago. The material was pine, and the timber was treated with about twelve pounds of oil per cubic foot. No particular attention was paid to the character of the oil. These pavements were quite satisfactory, although they swelled and bulged, making it often necessary to relay them

to quite an extent. The officials in charge of the work were almost ridiculed, and certainly laughed at to quite an extent, for their apparent folly in persisting in using wood as a paving material. But they continued their efforts, and the results obtained there were recognized finally by officials from other cities.

The first treated wood block pavement laid in the east was on Tremont Street, Boston, in 1900, in front of the Common, where one-half the street was laid with sheet-asphalt and the other half with wood. These blocks were treated by the so-called creo-resinate process, being impregnated with a mixture composed of one-half creosote oil and the other half resin. This pavement has been in use now for ten years with very little repair, and is in good condition at the present time.

The first pavement of this character in New York was laid

on State Street, Brooklyn, in 1902 at the expense of the contractor, the city setting the curb and laying the concrete base. The authorities were so well pleased with it that specifications were adopted and other streets paved during that and the following year. These specifications required the material to be long-leaf yellow pine, and that it should be treated with a compound composed of one-half creosote oil and the other half resin or some other suitable waterproofing material. They also provided that the blocks should sink in water, and after being dried at a temperature of 100° F. for twenty-four hours should not absorb more than three per cent. when immersed in water for another twenty-four hours.

The first pavements of this character in Manhattan were laid in 1904, with the same specifications as given above, on Warren Street west of Broadway, 20th Street between Broadway and



LOWER NEW YORK, WOOD BLOCK PAVEMENTS SHOWN IN HEAVY LINES

Fifth Avenue, and 98th Street between Central Park West and Columbus Avenue. The object in selecting these three streets was to have one of heavy, another of medium and the third of light traffic. These streets have now been laid nearly seven years and have been out of guarantee two years. They have required practically no repairs, although Warren Street, the heavy traffic street, does need some at the present time.

In 1904 other streets in the lower business section of the borough were paved with wood, the material with which the blocks were treated being composed of 50 per cent of creosote oil and 50 per cent of resin. The specifications required that the blocks should be impregnated with twenty pounds, per cubic foot of this material, and should show an absorption test of not more than 3 per cent after being immersed for twenty-four hours and dried as above.

The pavements laid in 1906 were laid under the same specifications.

In 1907, however, the specifications were materially changed. The specifications for timber, which had previously called entirely for yellow pine, were modified by admitting either long-leaf yellow pine, Norway pine, black gum, or tamarack, and the requirements for the preservative were changed so that it should be composed of 75 per cent of oil and 25 per cent of resin, the specific gravity of the oil to be 1.12. The absorption test still remained the same.

In 1908 another modification was made, requiring that treated gum blocks should weigh not less than fifty-five pounds per cubic foot; in other words, not less than twenty pounds per cubic foot more than the recognized weight of such blocks when untreated.

The depth of the blocks in all of the above specifications in Manhattan was 3½ inches.

On account of the modifications, as set forth above, a few streets were laid with gum blocks instead of yellow pine, but no Norway pine or tamarack blocks have been used.

The oil referred to in all of the above specifications was required to be a direct product of coal-tar.

In 1909 the claim was made to the city authorities that on account of the high specific gravity required for the oil free competition was not obtained, and a change in the specifications was called for. The matter was referred to a committee composed of the Chief Engineer of the Board of Estimate and Apportionment, the Chief Engineer of the Finance Department, and the Chief Engineers of the Bureaus of Highways of the different boroughs for an investigation and report. The committee examined into the matter very carefully, having several hearings and calling before it different manufacturers of wood block in an endeavor to obtain the best results with as great competition as possible.

The committee recognized that two properties were required of the preservative: one, to keep the block absolutely from decay; and the other, to keep it stable in size so that it would not contract when dry or swell when wet, thus bulging and causing a deformation of the pavement.

A plea was made before the committee for the adoption of an oil manufactured from water-gas tar, it being claimed that such an oil would be just as good, and could be obtained at much less expense than from coal-tar. After a careful investigation the committee adopted a specification for oil as follows:

The oil with which the blocks are to be treated shall be a stable, antiseptic and waterproofing oil from which the water has been removed by distillation, and which shall have a specific gravity of not less than 1.12 at 38° C. When distilled in the manner hereinafter described, the oil shall lose not more than thirty-five per cent. up to a temperature of 315° C. The distillate between 255° C. and 315° C. shall have a specific gravity not less than 1.02, the said specific gravity being taken at a temperature of 60° C.

The committee felt that with its then knowledge of the use of water-gas tar oil it was not willing to permit it to be used entirely. As it was claimed before the committee that the 1.12 oil that had been previously used was not a pure creosote, but was manufactured by adulterating the 1.03 creosote oil with coal-tar pitch, the committee was willing to allow the coal-tar creosote oil to be adulterated with the water-gas product to an extent not to exceed 50 per cent. By providing that the distillate between 255 and 315° C. should not be less than 1.02, this point was covered and these specifications have been in use in Manhattan ever since.

In February of 1910, a convention of officials from the different cities of the country was held in Chicago, and this same matter was again given careful consideration. The committee was made up of representatives of some ten different cities, practically all that had been using wood block to any extent. The specifications adopted there varied from the New York specifications as relate to oil in that they required that the oil should be a coal-tar product free from adulteration of any kind; should have a specific gravity of at least 1.10 at a temperature of 38° C.; that not more than 3 per cent of the oil should be insoluble by hot continuous extraction with benzol and chloroform; that on distillation the distillate should not exceed 2 per cent up to 150° C. and 35 per cent up to 315° C.; the mean of three determinations to be taken.

In October, 1910, a sub-committee for standardizing paving specifications of the American Society of Municipal Improvements reported on wood block specifications. These specifications were the same as the Chicago specifications except that they required that not more than 4 per cent of the oil should be insoluble in hot benzol and chloroform.

In New York City, in February, 1911, at another meeting of the City Officials for Standardizing Paving Specifications the committee on creosoted wood block practically reaffirmed its former specifications, but modified the specific gravity by making a maximum of 1.14 for the specific gravity at a temperature of 38°, leaving the minimum at 1.10; and provided that not more than 3½ per cent of the oil should be insoluble by hot continuous extraction with benzol and chloroform instead of 3 per cent as in former specifications.



BROADWAY, NEW YORK, SOUTH FROM CITY HALL.
Granite in foreground; wood block in distance, where traffic is heavy

The consideration of the specifications thus far has been regarding the character of the wood and its treatment rather than how the blocks should be laid.

In Brooklyn all wood blocks have been laid on a cement mortar cushion made of one part of cement and three parts of sand, one-half inch thick. The joints have been filled with clean fine sand. The pavement was guaranteed for five years.

In Manhattan the first three streets enumerated herein were laid in the same way and with the same guarantee. But subsequent pavements had a Portland cement grout joint and a ten-years' guarantee.

This matter also was considered in the city's engineer committee, and a guarantee of five years only recommended.

The principal changes made by the committee, in addition to making the preservative a 1.12 specific gravity product, not necessarily produced from coal-tar, without any admixture of resin, were making the depth of blocks four rather than three and a half inches, and making the guarantee period five rather than ten years. The preservative and guarantee changes would reduce, and the depth of block change would increase, the cost of the pavement. As an actual result the average cost of wood pavement in Manhattan in 1909, after the changes were adopted, was \$3.34 per square yard as against \$4.27 in 1908. Probably not all the reduction was on account of the specifications, but the most of it undoubtedly was.

The Borough of Manhattan is still using the 1909 specifications, except that sand has been substituted for both the mortar cushion and the grout joint.

At the present time the question most discussed in connection with wood block specifications is the character of the oil, and the following points are made by the opponents of such an oil as has been described in this article. One party objects entirely to the heavy oil on principle, believing the 1.03 to 1.06 specific gravity oil to be better than the heavier. The other objects not to the weight of the oil, but to the requirement that provides for its being a coal-tar product, claiming that an oil made from water-gas tar is just as good, and is much cheaper and more easily obtained.

It is generally admitted that the preservative must contain not only antiseptic but waterproofing qualities, although

it is possible that if the water could be kept entirely from the block it would not decay. The above qualities should be maintained as long as possible, as the pavements on most of the streets where wood is used would naturally rot out before they would wear out. In London and Paris it is different, the traffic in those cities being so great that the blocks are actually worn down thin by the traffic. Accordingly the blocks are given what would be considered in this country a superficial treatment only.

It is well known that creosote oil is a volatile substance, and it seems reasonable that whatever will increase its stability should also increase its value as a preservative.

The early advocates of treated wood blocks recognized this and sought to remedy the instability of the oil by mixing with the light oil an equal part of resin, the idea being that the mixture would be stable and act both as an antiseptic and as a waterproofing material. As the cost of resin increased, the one-to-one mixture was changed to one composed of three parts of 1.12 oil to one part of resin, and in 1909 the New York City engineers' committee, heretofore referred to, decided that a 1.12 oil was sufficient in itself, but did not feel justified in recommending an oil made wholly from water-gas tar.

The two important questions then seem to be: First, is a 1.03 to 1.06 specific gravity oil sufficiently stable to preserve a pavement for twenty or twenty-five years, both as to the durability of the wood itself and the liability of the surface to become deformed on account of swelling caused by undue absorption? Second, is a 1.12 specific gravity oil, made entirely from water-gas tar, as good a preservative, as outlined above, as one that is a straight coal-tar product?

All engineers should strive for the best work possible as well as the greatest competition in attaining this result. If either of the above questions can be answered in the affirmative wood block specifications should be changed accordingly. With



WOOD BLOCK PAVING, WILLIAMSBURG BRIDGE, NEW YORK

the present knowledge of the subject it seems doubtful if they can be so answered. From the present practice of the cities now using wood for street pavements it also seems that their engineers concurred in the above conclusion. But the matter is an important one, and one that should be investigated and a determination reached only after careful experiment. This work should be done only once, but by a careful and disinterested party.

In 1907 the Forest Service of the U. S. Department of Agriculture laid a wood pavement on Nicollet Avenue, Minneapolis, Minn., of seven different varieties of wood, the idea being to determine the relative values of each for paving purposes. The varieties used were hemlock, Southern pine, fir, Western larch, birch, tamarack, and Norway pine. Sufficient time has not elapsed to enable one to draw final conclusions, but the result must be valuable. If, now, this same department would undertake a series of experiments to determine the relative preservative properties of the different oils proposed for treating wood paving blocks, it would be performing a service that could be done by few if any municipalities, and one that could not fail to be of great value. Its conclusions, too, would be generally accepted.

COMMITTEES ON PAVEMENT SPECIFICATIONS

Owing to the interest felt by paving men generally in the specifications formulated and adopted by the Organization of City Officials for the Standardizing of Paving Specifications, many inquiries have been addressed to this Journal for the names of the members composing these committees. A list of these names will serve the double purpose of informing such interested parties whom to correspond with in connection with the several specifications and also will serve to indicate the standing of the men responsible for the specifications. This list of committees is as follows:

ASPHALT PAVEMENT

George W. Craig, City Engineer, Chairman, Omaha, Neb.
William R. Benson, Chief Bureau of Highways, Vice-Chairman, Philadelphia, Pa.
George W. Tonson, Chief Engineer, Toledo, O.
Felix Kleeberg, Chemist, Bureau of Highways, New York, N. Y.
F. N. Bingham, City Chemist, Spokane, Wash.

BITUMINOUS CONCRETE PAVEMENT

Linn White, Engineer South Parks, Chairman, Chicago, Ill.
L. W. Rundlett, City Engineer, Vice-Chairman, St. Paul, Minn.
W. H. Connell, Assistant Commissioner Public Works, New York, N. Y. (Bronx).
George W. Roberts, City Engineer, South Omaha, Neb.
G. F. McGonigal, City Engineer, Salt Lake City, Utah.

BONDS AND GUARANTEES

W. J. Hardee, City Engineer, Chairman, New Orleans, La.
Henry C. Allen, City Engineer, Vice-Chairman, Syracuse, N. Y.
E. A. Kingsley, City Engineer, Little Rock, Ark.
A. F. Damon, Consulting Engineer, Chester, Pa.
W. A. Hogue, City Engineer, Charleston, W. Va.

CEMENT, CONCRETE AND CONCRETE PAVEMENTS

N. E. Murray, Superintendent of Sidewalks, Chairman, Chicago, Ill.
George S. Smith, Commissioner Public Works, Vice-Chairman, New Orleans, La.
J. M. Burrows, Assistant Engineer, Des Moines, Ia.
Montgomery Schuyler, St. Louis, Mo.
John W. Paine, City Engineer, Akron, O.

CREOSOTED WOOD BLOCK PAVEMENT

Andrew Rinker, City Engineer, Chairman, Minneapolis, Minn.
J. C. Travilla, Street Commissioner, Vice-Chairman, St. Louis, Mo.
N. S. Sprague, Superintendent Bureau of Construction, Pittsburgh, Pa.
W. Purvis Taylor, Assistant Engineer of Tests, Philadelphia, Pa.
Walter M. Cross, City Chemist, Kansas City, Mo.

MACADAM PAVEMENT

J. L. Darnell, Consulting Engineer, Chairman, Kansas City, Mo.

Walter C. Leininger, Assistant Superintendent of Streets, Vice-Chairman, Chicago, Ill.
Edwin H. Thomes, Assistant Engineer, New York, N. Y. (Borough of Queens).
W. F. Brooke, City Engineer, Norfolk, Va.
Wright Smith, City Engineer, Mobile, Ala.

STONE BLOCK PAVEMENT

B. T. Fendall, City Engineer, Chairman, Baltimore, Md.
M. R. Sherrerd, Chief Engineer, Board Public Works, Vice-Chairman, Newark, N. J.
M. F. McKenna, City Engineer, Bridgeport, Conn.
S. W. Hoag, Jr., Assistant Engineer, Department of Docks, New York, N. Y.
John E. Ramsey, Consulting Engineer, Salisbury, N. C.

VITRIFIED BRICK PAVEMENT

E. H. Christ, member Board of Public Works, Chairman, Grands Rapids, Mich.
H. W. Klausmann, City Engineer, Vice-Chairman, Indianapolis, Ind.
James H. Sullivan, Deputy Superintendent of Street, Boston, Mass.
F. J. Cellarius, City Engineer, Dayton, O.
J. L. Meyers, City Engineer, Ardmore, Okla.

The specifications of this organization covering these various subjects are now in the printer's hands, and will probably be ready for distribution in a few weeks. No authorized copy of them can be furnished before that time, as it is the purpose of the organization to copyright them to prevent their being used by manufacturers of, and dealers in, paving materials in an unwarranted manner.

NEW STANDARD BRICK RATTLER

Recommended by National Paving Brick Manufacturers' Association—Exact Instructions for Constructing Rattler and Abrasive Charge—Method of Testing

The National Paving Brick Manufacturers' Association has formally adopted and recommended for use a rattler for testing brick practically identical with that described in our issue of November 16, 1910; also the spherical shot which the experiments referred to in that article indicated were preferable to cubical shot. As this rattler has now been formally recommended by the association, and we presume will be adopted by the several societies interested in the matter and by most cities using paving brick, we are presenting herewith the complete specifications for rattler and for shot.

The association will furnish without cost to probable users of paving brick complete drawings of the machine described in these specifications. In order that they might have definite information to give as to the cost of these machines, Mr. W. P. Blair, the secretary of the association, obtained from Hetherington and Berner, of Indianapolis, an offer to construct the machine for the following prices: Barrel, including plate liners and head liners, \$76.65; frame and mechanism generally, \$73.35; or \$150.00 for the rattler complete. For the plate liners they charge \$8.40 for a set of fourteen; and for the head liners \$16.25 for a set of two. For a set of 25 large spheres and 325 small spheres they charge \$22.50, or 4½ cents a pound.

Secretary Blair informs us that the Board of Control of the association has appointed a committee to carefully consider and revise the "Directions No. 1" brought out by the association two or three years ago for laying vitrified brick street pavements, with a view to correcting any failures in the original directions to clearly and concisely express their ideas as to the best method of laying brick pavements.

THE RATTLER

The machine shall be of good mechanical construction, self-contained, and shall conform to the following details of material and dimensions, and shall consist of barrel, frame and driving mechanism as herein described.

THE BARREL

The barrel of the machine shall be made up of the heads, head liners and staves.

The heads shall be cast with trunnions in one piece. The trunnion bearings shall not be less than two and one-half inches ($2\frac{1}{2}$) in diameter or less than six inches (6) in length.

The heads shall not be less than three-fourths inch ($\frac{3}{4}$) thick nor more than seven-eighths inch ($\frac{7}{8}$). In outline they shall be a regular fourteen-sided (14) polygon inscribed in a circle twenty-eight and three-eighths inches ($28\frac{3}{8}$) in diameter. The heads shall be provided with flanges not less than three-fourths inch ($\frac{3}{4}$) thick and extending outward two and one-half inches ($2\frac{1}{2}$) from the inside face of head to afford a means of fastening the staves. The flanges shall be slotted on the outer edge, so as to provide for two (2) three-fourths inch ($\frac{3}{4}$) bolts at each end of each stave, said slots to be thirteen-sixteenths inch ($\frac{13}{16}$) wide and two and three-fourths inches ($2\frac{3}{4}$) center to center. Under each section of the flanges there shall be a brace three-eighths inch ($\frac{3}{8}$) thick and extending down the outside of the head not less than two inches (2). Each slot shall be provided with recess for bolt head, which shall act to prevent the turning of the same. There shall be for each head a cast-iron head liner one inch (1) in thickness and conforming to the outline of the head, but inscribed in a circle twenty-eight and one-eighth inches ($28\frac{1}{8}$) in diameter. This liner or wear plate shall be fastened to the head by seven (7) five-eighths inch ($\frac{5}{8}$) cap screws, through the head from the outside. These wear plates, whenever they become worn down one-half inch ($\frac{1}{2}$) below their initial surface level, at any point of their surface, must be replaced with new. The metal of which these wear plates are to be composed shall be what is known as hard machinery iron, and must contain not less than one per cent (1%) of combined carbon. The faces of the polygon must be smooth and give uniform bearing for the staves. To secure the desired uniform bearing the faces of the head may be ground or machined.

THE STAVES

The staves shall be made of six-inch (6) medium steel structural channels twenty-seven and one-fourth ($27\frac{1}{4}$) inches long and weighing fifteen and five-tenths pounds (15.5) per lineal foot.

The channels shall be drilled with holes thirteen-sixteenths inch ($\frac{13}{16}$) in diameter, two (2) in each end, for bolts to fasten same to head, the center line of the holes being one inch (1) from either end and one and three-eighths inches ($1\frac{3}{8}$) either way from the longitudinal center line.

The space between the staves will be determined by the accuracy of the heads, but must not exceed five-sixteenths inch ($\frac{5}{16}$). The interior or flat side of each channel must be protected by a lining or wear plate three-eighths inch ($\frac{3}{8}$) thick by five and one-half inches ($5\frac{1}{2}$) wide by nineteen and three-fourths inches ($19\frac{3}{4}$) long. The wear plate shall consist of medium steel plate, and shall be riveted to the channel by three (3) one-half inch ($\frac{1}{2}$) rivets, one of which shall be on the center line both ways and the other two on the longitudinal center line and spaced seven inches (7) from the center each way. The rivet holes shall be countersunk on the face of the wear plate and the rivets shall be driven hot and chipped off flush with the surface of the wear plate. These wear plates shall be inspected from time to time, and if found loose shall be at once riveted, but no wear plate shall be replaced by a new one except as the whole set is changed. No set of wear plates shall be used for more than one hundred and fifty (150) tests under any circumstances. The record must show the date when each set of wear plates goes into service and the number of tests made upon each set.

The staves when bolted to the heads shall form a barrel twenty inches (20) long, inside measurement, between wear plates. The wear plates of the staves must be so placed as to drop between the wear plates of the heads. These staves shall be bolted tightly to the heads by three-fourths inch ($\frac{3}{4}$) bolts, and each bolt shall be provided with lock nuts, and shall be inspected at not less frequent intervals than every fifth (5th) test and all nuts kept tight. A record shall be made after each such inspection, showing in what condition the bolts were found.

THE FRAME AND DRIVING MECHANISM.

The barrel should be mounted on a cast-iron frame of sufficient strength and rigidity to support same without undue vibration. It should rest on a rigid foundation and be fastened to same by bolts at not less than four (4) points.

It should be driven by gearing whose ratio of driver to driven should not be less than one (1) to four (4). The counter shaft upon which the driving pinion is mounted should not be less than one and fifteen-sixteenths inches ($1\frac{15}{16}$) in diameter, with bearings not less than six inches (6) in length and belt driven, and the pulley should not be less than eighteen inches (18) in diameter and six and one-half inches ($6\frac{1}{2}$) in face. A belt of six-inch (6) double-strength leather, properly adjusted so as to avoid unnecessary slipping, should be used.

THE ABRASIVE CHARGE

(a) The abrasive charge shall consist of two sizes of cast-iron spheres. The larger size shall be three and seventy-five-hundredths inches (3.75) in diameter when new and shall weigh when new approximately seven and five-tenths pounds (7.5) (3.40 kilos) each. Ten shall be used.

These shall be weighed separately after each ten (10) tests, and when the weight of any large shot falls to seven pounds (7) (3.175 kilos) it shall be discarded and a new one substituted; provided, however, that all of the large shot shall not be discarded and substituted by new ones at any single time, and that so far as possible the large shots shall compose a graduated series in various stages of wear.

The smaller size spheres shall be when new one and eight hundred and seventy-five thousandths inches (1.875) in diameter and shall weigh not to exceed ninety-five hundredths pounds (0.95) (0.430 kilos) each. Of these spheres so many shall be used as will bring the collective weight of the large and small spheres most nearly to three hundred pounds (300), provided that no small sphere shall be retained in use after it has been worn down so that it will pass a circular hole one and seventy-five hundredths inches (1.75) in diameter, drilled in a cast-iron plate one-fourth inch ($\frac{1}{4}$) in thickness or weigh less than seventy-five hundredths (0.75) pounds (or 0.34 kilos). Further, the small spheres shall be tested by passing them over such an iron plate drilled with such holes, or shall be weighed after every ten (10) tests, and any which pass through or fall below specified weight shall be replaced by new spheres, and provided, further, that all of the small spheres shall not be rejected and replaced by new ones at any one time, and that so far as possible the small spheres shall compose a graduated series in various stages of wear. At any time that any sphere is found to be broken or defective it shall at once be replaced.

(b) The iron composing these spheres shall have a chemical composition within the following limits:

Combined carbon—Not less than 2.50%.

Graphitic carbon—Not more than 0.10%.

Silicon—Not more than 1%.

Manganese—Not more than 0.50%.

Phosphorus—Not more than 0.25%.

Sulphur—Not more than 0.08%.

For each new batch of spheres used the chemical analysis must be furnished by the maker, or be obtained by the user, before introduction into the charge, and unless the analysis meets the above specifications, the batch of spheres shall be rejected.

THE BRICK CHARGE

(a) The number of brick per charge shall be ten (10) for all bricks of the so-called "block size" whose dimensions fall between from eight (8) and nine (9) inches in length, three (3) and three and three-fourths ($3\frac{3}{4}$) inches in breadth and three and three-fourths ($3\frac{3}{4}$) and four and one-fourth inches ($4\frac{1}{4}$) in thickness. No block should be selected for test that would be rejected by any other requirements of the specifications.

The brick shall be clean and dried for at least three hours (3) in a temperature of one hundred (100) degrees Fahr. before testing.

THE TEST

The rattler shall be rotated at a uniform rate of not less than $29\frac{1}{2}$ nor more than $30\frac{1}{2}$ revolutions per minute, and 1,800 revolutions shall constitute the standard test.

A margin of not to exceed ten (10) revolutions will be allowed for stopping.

STOPPING AND STARTING

Only one (1) start and stop per test is regular and acceptable.

A counting machine shall be attached to the rattler for counting the revolutions.

THE RESULTS

The loss shall be calculated in percentage of the original weight of the dried brick composing the charge. In weighing the rattler brick any piece weighing less than one (1) pound shall be rejected.

RECORDS

(a) The operator shall keep an official book, in which the alternate pages are perforated for removal. The record shall be kept in duplicate, by use of a carbon paper between the first and second sheets, and when all entries are made and calculations are completed the original record shall be removed and the carbon duplicate preserved in the book. All calculations must be made in the space left for that purpose in the record blank, and the actual figures must appear. The record must bear its serial number and be filled out completely for each test, and all data as to dates of inspection and weighing of shot and replacement of worn-out parts must be carefully entered, so that the records remaining in the book constitute a continuous one. In event of further copies of a record being needed, they may be furnished on separate sheets, but in no case shall the original carbon copy be removed from the record book.

GRANITE BLOCK SPECIFICATIONS

A CONTRACT has just been let for paving fifteen blocks of Fourth Avenue, New York City, with granite blocks under specifications which "are quite a departure," says Chief Engineer Tillson, "from any that have been used before in this city, and the department thinks that they will give the best granite pavement that has ever been laid in the country." The most noticeable clauses of the specifications are as follows:

Paving Cement

The paving cement to be used in filling the joints between and around the paving blocks and bridgestones, as hereafter provided, shall be of the best pitch, obtained either from the distillation of coal tar or from asphaltic oils, and must have the following properties:

Paving Filler from Coal Tar.—Its specific gravity shall not be less than 1.23 at 60 deg. Fahr. Its melting point shall be not less than 130 deg. nor more than 140 deg. Fahr. It shall contain not less than 22 per cent nor more than 35 per cent of free carbon.

Paving Filler from Asphaltic Oils.—Melting point not less than 195 deg. Fahr. nor more than 210 deg. Fahr. Shall be soluble in carbon tetrachloride to the extent of 99.5 per cent. Shall have a penetration at 77 deg. Fahr. when tested with a No. 2 needle and 100-gram weight for five seconds of not less than 30 nor more than 40, and shall have a penetration at 32 deg. Fahr. when tested with a No. 2 needle and a 200-gram weight for one minute of not less than 18 nor more than 30.

The above determinations are to be made in accordance with the standard methods adopted by the laboratory of this bureau, descriptions of which methods are on file in the office of the Chief Engineer.

The Blocks

Where the contract calls for improved granite the stones shall be of equal quality as that specified for the ordinary granite. The size of the blocks, however, shall be as follows: not less than 7 nor more than 11 inches in length; not less than $3\frac{1}{2}$ nor more than $4\frac{1}{2}$ inches in width, and 5 inches in depth. A variation of $\frac{1}{4}$ of an inch each way will be allowed in the depth of the blocks. The blocks are to be rectangular, with tops and sides uniform in thickness, to lie close and with a fair and true surface; free from bunches and so cut or dressed that when laid stone to stone the joints shall not exceed $\frac{3}{8}$ of an inch in width. The head of the block shall be so cut that it shall not have more than $\frac{1}{4}$ of an inch depression from a straight edge laid in any direction across the head and held parallel to the general surface of the block. Over special constructions the blocks may be of dimensions other than above specified when approved by the engineer.

The stones from each quarry shall be piled and laid separately in different sections of the work, and in no case shall the stone from different quarries be mixed. The blocks must be separated before they are brought upon the work into two classes, one from $3\frac{1}{2}$ to 4 inches and the other from 4 to $4\frac{1}{2}$ inches in width, and so delivered on the street.

Laying

On a sand bed one inch in thickness placed upon the concrete shall be laid the stone blocks at right angles as may be directed. Each course of blocks shall be of the same width and laid straight and regularly, making with the end joints a lap of at least 3 inches, and in no case shall stones of different widths be laid in the same course except on curves. The blocks shall be laid stone to stone, so that the joints may be as small as possible. After the blocks are laid dry sand shall be spread over the surface of the pavement and broomed into the joints in such quantity as to fill same to within 3 inches from the top.

Ramming

The blocks must then be thoroughly rammed and the ramming repeated until they are brought to an unyielding bearing with a uniform surface, true to the given grade and crown. No ramming shall be done within 20 feet of the face of the work that is being laid.

Temperature of Paving Cement

The boiling paving cement, heated to a temperature of 300 deg. Fahr. and of the composition hereinbefore described, shall then be poured into the joints until the same are full and remain full. The joints shall be poured a second and third time, if necessary, so that they shall remain permanently filled with the paving cement.

The appliances for heating paving cement shall be sufficient in number and of such efficiency as will permit the pourers to closely follow the back rammers, and all joints of the finally rammed pavement shall have been filled with paving cement, as above noted, before the cessation of the work for the day or any other cause.

No Carting on Pavement

No horse, cart, truck or vehicle of any description shall be permitted to stand on, or pass over, the pavement until the joints have been finally poured with cement as above and the same has had time to harden, and, by car tracks, the contractor shall furnish men to pass cars thereover.

Maintenance

The contractor shall immediately repair and make good to the satisfaction of the engineer any settlement or any depression in the pavement which shall occur at any time during the period of one year from the date of the acceptance of the whole work; * * * and if the termination of the said period of maintenance shall fall within the months of December, January, February or March, then, and in that case, the said months of December, January, February and March, or such part thereof as the president may determine, shall not be included in the computation of the said period of one year during which the work is to be kept in repair by the contractor, and in that case the payment to be made under the provisions of this contract shall not be made before the first of April next thereafter, unless otherwise specially permitted by the president.

In case there are railroad tracks in any street or public place within the limits of this contract, then this maintenance clause shall not apply to those portions of the street or public place between such tracks, between the rails of the tracks and for 2 feet in width outside of the tracks.

The Borough President reserves the right to allow any railroad company to pave the railroad area by special contract.

The contractor shall have the right, in the case of trenches, to provide against settlement by covering the surface of the cut with broken stones and maintaining the surface for six days.

During the period of maintenance the contractor shall, within five days after the receipt of notice so to do, restore the pavement over all openings made by corporations or plumbers for making new service connections, or repairing, renewing or removing the same, and over all trenches made for carrying sewers, water or gas pipes, or any other subsurface pipes or conduits, for the building or laying of which permits may be issued by the president, for the sum of \$3.50 per square yard for all openings less than 10 square yards in area, and \$3 per square yard over all trenches measuring more than 10 square yards in area, and \$3.50 per square yard for restoring the pavement over all openings between or alongside of surface railroad tracks which shall exceed 10 square yards in area, except that in case of an injury to the surface of the pavement, caused by fire or accident, it shall be replaced for the sum of \$2.50 per square yard. The concrete foundation as relaid shall be 6 inches in thickness. It shall consist of 1 part of the best quality of Portland cement, 3 parts of sand and 6 parts of broken stone. All materials to be of the same quality and mixed in the same manner as specified in this contract. The contractor shall not demand additional or further payment on account of repairing any injured or sunken pavement laid over the repairs above described.

The period of maintenance shall be in force through the year, irrespective of any changes that may occur in traffic conditions, on or across said streets, whether due to the widening of said roadway or to the construction, reconstruction or rearrangement of new or existing surface or subsurface constructions thereon, or to any other cause.

The amount included in this contract is 22,190 square yards. It was awarded to the Republic Construction Company, the lowest bidder, at \$3.55 per square yard; the highest bid being about 37 per cent greater.

It will be noticed that the blocks specified are to have no greater variation from a plane surface than $\frac{1}{4}$ inch on the head, and practically the same on the sides. This is a much more regular block than that heretofore specified and used.

With these narrow joints gravel could not be used for filling them, and sand and pitch or asphaltic filler will be used. It is considered impracticable to use Portland cement filler, since this would require the closing of the street to all traffic for a week or ten days and this the department does not believe the citizens would "stand for," nor could it be enforced without a squad of police at every cross street.

OILING SHELL ROADS

In his annual report for 1910, city engineer J. H. Dingle, of Charleston, S. C., states that one of the shell roads of that city was oiled at a cost of $5\frac{1}{2}$ cents per square yard, but the results of this were not as satisfactory as of oiling macadam. The shell, after being thoroughly compacted by rolling and traffic, absorbs the oil to a very limited depth only, and the shell is soon abraded to this depth and blows away.

WOOD BLOCK PAVEMENTS OF ATLANTA

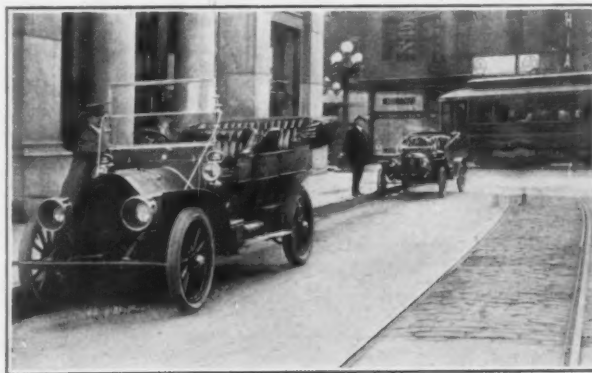
The Earlier Pavements—Modern Treatment and Construction —Statistics Showing Extent and Cost of Pavements and General Conclusions

By JAMES NISBET HAZLEHURST, Consulting Engineer

ATLANTA'S first advertisement and entry into national notice came through Sherman's famous march to the sea. The torches which lighted the desolation of war focused general attention to this section. This unsolicited and gratuitous advertisement was followed by an influx of new population and in 1880 Atlanta's civic pride and the first industrial exposition, following that of the Centennial at Philadelphia, resulted. These two occurrences were epochs commemorating an awakened spirit and progressive tendencies growing like the proverbial mushroom. Pressing demand for better roadways resulted in the laying of many miles of Belgian block pavements, quarried from the famous "Stone Mountain," one of the most remarkable granite formations in the United States, and located less than twenty miles from the city of Atlanta. This stone pavement was laid only on a sand cushion and cost less than \$1.50 per square yard. It was badly laid and maintained, and during the past ten years the imperative need for better streets to accommodate increasing traffic resulted in the laying of the first modern rectangular treated block pavements. Some ten or twelve years before the present time a pioneer citizen of Atlanta succeeded in enlisting the sympathy of the city officials in a wood block pavement on one of the principal avenues of the city. The construction of this pavement followed that then in vogue at Paris, France, and other continental cities, but also partook of some of the features of the old Nicholson block. The material consisted of untreated timber sawed into cubes of about 6-inch dimensions; these were laid upon board foundations, were grouted in with a tar filler and then heavily coated with sand sprinkled over the top and rolled to a smooth surface. As might be expected at this time, this street is in bad condition and will shortly have to be entirely relaid.

The first creosoted wood block pavement was placed in 1904

upon one of the highway bridge floors, but it was not until 1905 that a well prepared and well laid wood pavement was introduced into the city of Atlanta. This came about through a private enterprise. The Candler Investment Company, then completing a marble seventeen-story office building, said to be second only in attractiveness and general utility to the Frick Building of Pittsburgh, determined to take up at their own expense the granite block which surrounded two sides of this structure and to replace this material with the best and most modern type of pavement. The materials were purchased by



HOUSTON STREET, CANDLER BUILDING ON THE LEFT

the Investment Company and were laid under the direct supervision of Hon. Henry L. Collier, then Commissioner of Public Works of the city. The blocks were of the long leaf yellow variety of southern pine and prepared under the well known creosote-resinate process of treatment. They were laid upon six inches of 1-3-6 concrete, upon a thin mortar bed, the blocks being pressed to position by templet. (An illustration shows this section of pavement, the street being elsewhere surfaced with granite.) The traffic at this corner is hardly so great as that upon the streets adjacent, but still the pavement is subject to considerable travel. A careful examination shows no visible deterioration or evidence of wear.

Below appears a table giving the statistics of Atlanta's modern wood block pavements, and from which it will be noted that

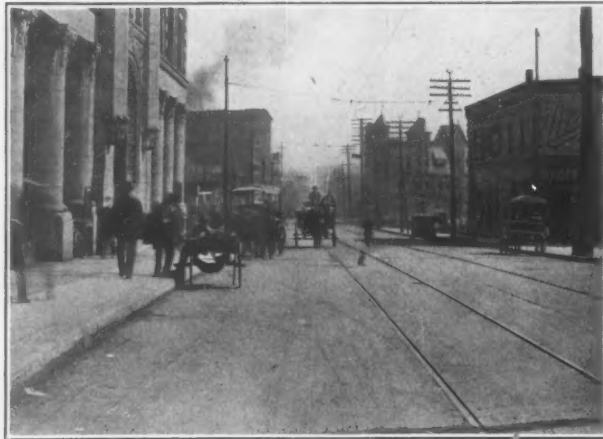


MARIETTA STREET AT INTERSECTION WITH NORTH FORSYTH STREET

since 1907 there has been laid by the city approximately $4\frac{3}{4}$ miles of creosoted wooden block pavements totaling 92,418 square yards, at an average price of \$2.75 per yard, making a total expenditure of \$252,301.11 during the past four years:

STATISTICS OF WOOD BLOCK PAVEMENTS

Name of Street.	Year.	Length, Width,		Yards.	Price.
		Feet.	Feet.		
Edgewood Avenue.....	1907	5,263	40	24,305	\$3.10
Forsyth Street.....	1907	715	40	3,315	3.20
Broad Street.....	1908	2,290	50	12,859	3.29
Marietta Street.....	1910	1,250	100	10,237	2.449
Marietta Street.....	1910	7,128	100	7,128	2.46
Forsyth Street.....	1910	503	40	2,186	2.56
Decatur Street.....	1910	5,015	40	22,075	2.499
Madison Avenue.....	1910	736	32	2,700	2.58
Peter Street.....	1910	545	32	1,938	2.68
N. Boulevard.....		930	..	2,675	2.56
N. Forsyth Street.....		752	..	2,400	2.66
Total		25,127		92,418	\$2.73



EDGEWOOD AVE., LOOKING EAST FROM PRIOR ST.

An analysis of the table will show a radical difference in the cost of the pavement since the year 1910, and this can be accounted for largely by the fact that at this time there is in operation a local treatment plant, whereas before the blocks were shipped from creosoting works along the Gulf coast.

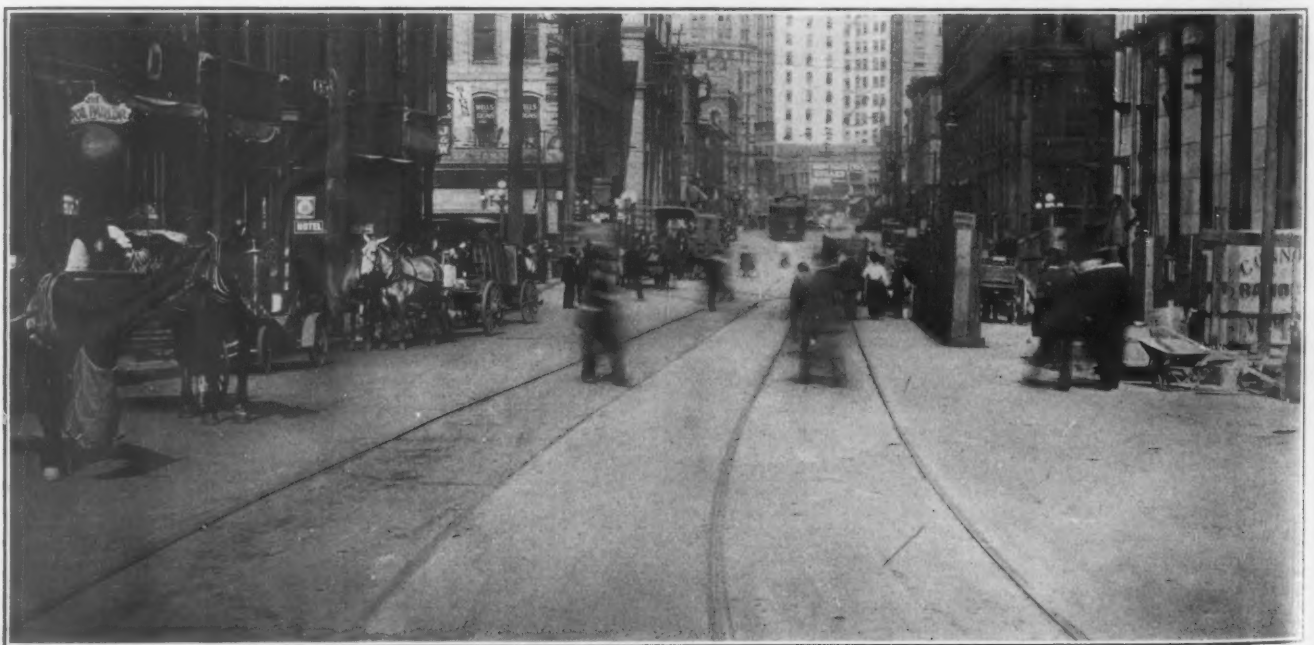
CONSTRUCTION

The foundations for the pavement under the existing specifications require the base to be of Portland cement concrete in proportions 1-4-8, to be mixed and laid in the usual manner. They reserve the right to lay the block at such angles with the curb as the engineer may elect, but except at intersections the practice is to place them in parallel courses at right angles to

the curb, the blocks in adjoining courses breaking joints. Three courses are laid next to and parallel with the curb, at which point three expansion joints $\frac{1}{2}$ inch in width are provided for, to be filled with No. 6 coal tar paving pitch poured at a temperature of 300 deg. Fahr. Other expansion joints may be constructed as directed by the engineer, and in general such joints are placed along the line of the street at intervals of about 50 feet. The blocks are laid upon a cushion of clean sand evenly spread over the foundations to a depth of $\frac{1}{2}$ inch and rolled to a surface with a steam roller. After rolling a sand filler is swept into the joints.

The surfacing material must consist of wood blocks of the following dimensions: 3 or $3\frac{1}{2}$ inches in depth, 3 inches in width and from 6 to 8 inches in length, with the fiber of the wood running in the direction of the depth. The wood from which the blocks are to be made must be long leaf yellow pine, 90 per cent of which shall be heart, the blocks shall be well manufactured and free from the usual objectionable defects. No block shall vary in width and depth more than $\frac{1}{16}$ of an inch from other blocks used on the same street or contract. The specifications provide that all blocks shall be treated with creosote or some approved antiseptic or waterproof mixture, and each block shall contain at least 20 pounds of such compound per cubic foot of wood, provided that where a block contains much natural pitch it shall receive as much of the mixture as can be forced into it under the usual treatment. The preservative specified is the dead oil of coal tar or coal tar product. It must not contain more than 3 per cent of water and a correction shall be made in the amount of creosote used to correspond to the water found in the oil. Only traces of acids are permitted. Its specific gravity at 68 deg. Fahr. shall be not less than 1.12 nor more than 1.15; the oil with which the blocks are treated shall not contain more than 2 per cent free carbon, nor more than $2\frac{1}{2}$ per cent insoluble in benzole.

The crown of the streets paved with wood ranges from 6 inches on 40-foot streets to 12 inches on 100-foot roadways. There is no maximum grade limit for wood pavements, but so far as known no such pavement has been laid upon grade steeper than 4 per cent. In observing the traction conditions during wet weather, the writer has noted the fact that where a team is approaching a steep grade, as for instance the maximum 4 per cent, the tendency to slip and to slide does not seem to be in the direction of the pull, but at right angles thereto. On a street 40 feet wide with 6 inches crown the slope is 3 feet per 100 at right angles to the line of direction, and as the animals are pulling against each other as they go up the rise, the



BROAD STREET, LOOKING NORTH FROM VIADUCT

tendency seems for one or the other to slip so as to fall under its companion. In other words, the slip is toward the side of the roadway rather than in its direction. From this it might be argued that the cross-section should be considerably modified where wood block pavement is used as a surfacing material.

Captain R. M. Clayton, M. Am. Soc. C. E., is city engineer and prepared the specifications and supervised the construction of this work. It might be mentioned that up to about a year ago the standard specifications provided for an oil of 1.07 gravity. There was a conflict over this provision in which rival companies and interested citizens succeeded in holding up the work and securing an investigation, the net result being a change in the specifications as hereinbefore written.

At the present time the negro is the prevailing unskilled laborer with ruling wages for such work of \$1.50 per day of ten hours. Broken stone delivered along the street may be had for \$1.50 per cubic yard; concrete sand, \$1 per cubic yard, and cement, \$1.25 net per barrel. Teams are worth \$4 per day with able drivers; foremen, \$4 for ten hours' time.

CONCLUSION

According to the United States census of 1910 the city has a population of 154,000. The business streets are generally from 40 to 50 feet in width, but one of them, Marietta Street, is 100 feet between curb lines. Traffic upon these streets is generally shown by the illustrations, although no statistics are available showing the extent and character of same. The street work included in the table has been laid within the congested district of the city and has been subject to the heaviest traffic due to this fact. There has been no expense for maintenance to this time and no repair work done beyond removing and replacing a small amount of this work on Edgewood Avenue along the street railway tracks, which have rails of the 7-inch grooved girder type. The blocks abut directly against the rail and an insufficient foundation to these tracks at this particular point is given as the cause of the slight trouble.

Since the commencement of the modern wood block pavement in this city no other type has been used so far as known, with the exception of certain streets which are paved by the County Commissioners with a bituminous pavement and a few streets which have been cherted or laid with a tar macadam in outlying districts. In general both the city officials and the taxpayers are entirely satisfied with the materials furnished and work performed, and at this time wood block is the most popular of the street surfacing materials in this city.

OIL MACADAM IN CALIFORNIA

An interesting discussion on the construction of oiled macadam roads was held at the thirteenth annual convention of the League of California Municipalities. Mr. John Beyer, of Pasadena, opened the discussion by describing the method employed in that city. They put in 6 inches of material for the foundation, experience having shown that it will roll down one-third or to 4 inches. While the base is being rolled, screenings are thrown on the surface to fill all the voids and make it quite dense, but not so much so that the second course will not readily unite with it. Three-fourths of a gallon of oil per square yard is applied to the base after the first rolling, following which it is rolled again and No. 2 rock (from 3/4-inch to 1 1/4-inch size) is spread and graded perfectly to a smooth surface. Following this, three-fourths of a gallon of oil to the square yard is applied to the second course. It is then rolled and a 3/4-inch top surface is put on and graded. "If you have a competent man on your grader he can make almost as true a surface of the street as a board run through a planer in a mill." On this, again, oil is applied to the extent of 1/4 to 3/4 gallon, on which screenings are spread and the street is given a final rolling and is then ready for traffic.

In response to questions, Mr. Beyer stated that they sprinkled the oil with water, "More, perhaps, so that we can get right into it with the roller without picking it up at all. I think it also has a tendency to spread oil throughout the base. At any rate, we can go right into the base with a wagon without the

oil sticking to the roller and that gives us a chance to put on the succeeding layers and run our roller without trouble." Replying to another question as to whether there was not a tendency to use too much oil, Mr. Beyer stated that this was often the case, instancing one street where the property owners insisted on the use of more oil, which was finally consented to, but the contractor was told to keep his oil good and hot and leave as little on the street as possible. Although he carried out these instructions, in less than two weeks it was necessary to apply more sand, and two or three weeks later the grader with its blade ground perfectly sharp was used to shave off some of the oil.

The cost of such a road in Pasadena, 6 inches thick was 10 cents a square foot. The work cost \$1.90 a cubic yard, delivered on the street. The oil used had a gravity of 10 to 11 and carried less than 75 per cent asphalt.

WOOD BLOCK PAVING IN ABERDEEN

Tamarack with Sixteen-Pound Creosote Treatment—Laid at Angle with Curb—Low Crown—Swelling of Blocks—Laying Along Rails

By R. B. EASTON, Jun. Am. Soc. C. E., City Engineer

ABERDEEN, S. D., is a thriving western metropolis of approximately 11,000 inhabitants as shown by the latest United States census and is fast becoming a great jobbing and distributing point for all the western country recently opened up by the Puget Sound line of the Chicago, Milwaukee and Puget Sound Railroad, and all of that vast new country which is rapidly springing into prominence looks toward Aberdeen for its supplies of every description. Nine lines of railroad, a clearing house record of over \$20,000,000.00 for 1909, which was exceeded in 1910, together with a wholesale business of \$12,000,000.00 in 1909, and which also was exceeded in 1910, are all evidence of the vast amount of business done in the city.

The importance of the city as a transfer point for freight, together with the progressive attitude of citizens, led to the first paving, which was laid in 1907 under the supervision of Mr. D. C. Washburn, Mem. Am. Soc. C. E., then city engineer, and the writer, then assistant city engineer. The material was a three-inch block of Norway pine or tamarack having a sixteen-pound creosote treatment. The blocks were laid on a five-inch foundation of 1:6 pit run sand and gravel concrete on top of which was a one-inch sand cushion of sifted sand. The crown of the pavement laid in 1907 is about 2 per cent of the width of the street between curbs and the transverse section is a parabola. The blocks were laid at an angle of about 22 1/2° with the curb and were rolled to a true crown with a five or six-ton steam roller, after which pitch was poured on hot so as to entirely fill all the joints as well as an expansion joint of about one inch along either curb. This pitch was spread with an ordinary hand scraper under rigid inspection. After the pitch had cooled a thin layer of fine sand was spread over the entire pavement to take up the surplus pitch on top of the blocks.

During the block laying two inspectors were kept busy searching for poor blocks having rotten centers or wind shakes, and these together with all blocks whose length was less than three inches were thrown to one side and not used.

The 1907 paving, amounting to 31,125.1 square yards, was laid by the Kettle River Company, of Minneapolis, Minn., at a cost to the city of \$92,888.55. The cost per yard was \$2.84, to which was added a ten-year guarantee of 5 per cent, making the actual cost to the city \$2.98 per square yard. The cost of the paving, with the exception of the street intersections which were paid out of a general fund, was assessed on the abutting property in the manner common to special assessments.

In 1908 other business streets were paved under practically the same specifications by Messrs. Flinn and Hanlon, of Sioux City. The total amount laid in 1908 was 14,336 square yards and the cost to the city was \$39,280.55. The cost per square

yard was \$2.74 and there was no guarantee. The cost of paving the intersections was paid from a general fund.

In the year 1909 the people, not yet being satisfied, asked for still more paving and accordingly some 42,600 square yards were laid of creosote block as before and under about the same specifications. A portion of the work was given a crown of about $2\frac{1}{2}$ per cent. The total cost of the 1909 paving was about \$112,040.00 or at the rate of \$2.63 per square yard. The entire cost was assessed against the abutting property and none was paid for from the general fund.

In 1910 paving was laid under the supervision of the writer and some departure was made from the specifications of former years. Considerable trouble had been experienced from the slippery condition of the older paving, particularly that laid in 1909 and crowned about $2\frac{1}{2}$ per cent, which paving was often extremely slippery in cold weather or when the streets were being sprinkled. At either time pedestrians occasionally fell and many horses and teams secured hard falls, in some cases injuring the horses severely. Accordingly the crown was not allowed to exceed 2 per cent of the width of the street between curbs and was made slightly less wherever possible. This, while not draining the street quite so rapidly, secures a roadway every foot of which is a driving way and which is free from danger to pedestrians and horses.

Another change also was made in the filler used and in the expansion joints. The pitch used on the older pavement becomes very sticky in warm weather and fails to provide the necessary expansion during late winter when the days are warm and the nights quite cold. Accordingly "Pioneer Asphalt" filler was used, being put on in the same way as the pitch filler. A transverse expansion joint at every hundred feet was added in addition to the usual expansion joint along the curb. Considerable trouble was experienced in heating the asphalt sufficiently to thoroughly enter all the joints, the melting point of the asphalt filler being much higher than for the pitch. While the asphalt filler is yet new it seems to be the superior of the two classes of filler, during recent warm days this filler being soft and elastic, while the pitch was yet hard and glassy, and in addition the asphalt tends to make the street still more noiseless than does the other filler. It was noticed recently that the asphalt had been crowded out of the expansion joints by the expansion of the blocks so that it stood up in ridges, showing that it was performing its function in proper manner. While it is too early to tell which will be found the superior filler in the long run the asphalt so far shows several points of advantage. Taken altogether, the low-crowned street with the asphalt filler seems to please those who use it more than the older streets, and they more than any one else deserve a careful hearing.

It is contended by some that the lower crown will not provide rapid enough drainage to the gutter, but it would seem that the traffic using the street should receive prior consideration, for it is with this traffic in view that the streets are paved; and if it is found that the paving will not drain satisfactorily and prevent decay then a change must be made for another kind of paving which will meet the requirements.

However, the question of the longevity of the pavement and the maintenance expense is worthy of serious consideration; 108,607 square yards of pavement representing an investment of \$297,424.00 is no small item of expense in the development of a city of this size and its life and maintenance cost become vital factors in the determination. While our pavement is all too new to decide from it the advisability of its use, the following observations may prove interesting. Traffic over our streets is large; the immense amount of transfer and wholesale freight shipped in and out of the city is all teamed over this pavement and as a result traffic on our streets compares favorably in amount with that in many larger cities. So far no wear whatever is apparent on any of the blocks. In one case, along the side of a railroad freight house a gutter was formed some five or six feet from the building, the paving being sloped upward from the gutter toward the building rather too sharply so that heavy teaming which took place along the side of the

freight house crushed and misplaced some of the blocks, but this was due to too sharp a slope rather than to the fault of the blocks themselves.

A considerable amount of trouble has been and is being experienced with the bulging of the 1907 and 1908 paving during wet weather, and also at the present season when the days, being warm, allow the ice and snow to melt, while the nights are cold. The street department is kept busy at such times taking up and re-laying these places and while the blocks themselves do not seem to be injured the expense is considerable. It might seem that the blocks were laid too closely when first put down, but such was not the case. The real cause seems to be a combination of rather sluggish drainage combined with the considerable expansion of wood upon becoming wet. Our topography is very flat, necessitating gutters on grades of one-third of one per cent and sometimes less. The only remedy or partial remedy for the trouble during the present season of the year would seem to be in carting the snow from the streets after each storm, thereby preventing the formation of ice which must remain and melt on top of the pavement.

During the past year street car tracks have been laid through a considerable part of the 1907 and 1908 paving. During the progress of this work opportunity was afforded for the inspection of the sub-grade and in a few cases settlement was noted in the material in house connection ditches showing the need for extreme care in back-filling and tamping these.

In re-laying the blocks between the car tracks the blocks in contact with the "T" rails, being three inches thick, fitted into the channel between the head and base of the rail and were laid in that manner, the balance of the blocks being laid so that the section of the pavement between the rails was crowned slightly between them. It is expected that this arrangement will prove unsatisfactory, for placing the block in contact with the rail in the channel formed by the head and base of the rail forms too deep a groove in the pavement inside the rail, causing teams much trouble in getting the wheels out of the groove and endangering light or old wheels. The solution of the trouble will perhaps be in a block specially cut to fit alongside the track and preventing so deep a groove.

From our experience here it is quite evident to the writer that the street to be paved should be prepared one season and the paving laid the next. Adequate ordinances should be passed specifying when and how public corporations should perform their work in the streets; sufficient help should be afforded the engineering department to see that the ordinances are enforced; the city should see to it that all public sewers and water mains are in; power should be given the engineering department to have curbing changed and re-built where necessary to make a more perfect street gradient, and with this necessary work done a season ahead of the paving the resulting street when paved would be better in every respect and the economy in the long run be considerable.

WOOD JOINTED GRANITE BLOCKS

DURING the year 1910 there was tried in several cities, including Boston, Mass.; Baltimore, Md.; Jersey City, N. J., and Brooklyn, N. Y., a pavement which is believed to be novel in one of its features. This consists of a granite block paving in which the blocks are wedged apart and held in place by oak wedges driven into the joints. According to Mr. L. K. Rourke, Commissioner of Public Works, then Superintendent of Streets, of Boston, old granite blocks were used and these, when being laid, were left with joints sufficiently open to permit the use of the white oak wedges, and these wedges were driven into the joints between the blocks of successive rows until the top of the wedge projected about $\frac{1}{4}$ inch above the tops of the blocks, the projecting part of the wedge being broomed down by the traffic so as to more or less fill the depressed parts of the pavement formed by the rounded edges of the blocks. It was thought that these wedges would serve several purposes, not only preventing the blocks from rocking, but also making the pavement much less slippery and deadening the noise to a considerable extent.

TERMS USED IN BITUMINOUS ROAD WORK

Definitions by United States Office of Public Roads of the Various Bitumens Used for Road Treatment, Their Essential Constituents and Characteristics—Terms Used in Testing and Distillation

ONE of the most welcome pamphlets which has been issued recently by the Department of Agriculture is Circular No. 93, of the Office of Public Roads, in which Mr. Prevost Hubbard, chemist of the office, defines the various terms used in bituminous road construction and maintenance, especially the materials used therein. Certain of the terms therein defined are those over which committees on bituminous nomenclature have been struggling for a year past, among them being *artificial asphalt*, *artificial bitumen*, *asphalt*, *bitumen* and *bituminous*. Most of them are terms which are continually appearing in articles treating of bituminous road construction, the meaning of some of which is probably not well understood by many engineers; among these being *Baumé*, *carbenes*, *malthas*, etc. Of so much value is this that that we offer no apology for publishing it entire, as we believe that a great many of our readers will be glad to have a brief and authoritative glossary of terms of this nature for reference.

Mr. Logan Waller Page, Director of the Office of Public Roads, states in reference to these definitions: "In view of the newness of the subject and lack of complete data, some of the statements made may in the future require modification. This circular will, therefore, be revised from time to time in order to keep it abreast with the latest information possible."

GLOSSARY OF BITUMINOUS ROAD CONSTRUCTION

So much confusion exists among road engineers and others interested in bituminous road binders concerning the meaning of certain terms as applied to these materials that it has seemed advisable to present in brief form the definitions of such terms as at present used by the United States Office of Public Roads. It should be understood, however, that these definitions are at present more or less arbitrary, owing to wide differences of opinion held by those who are considered authorities on the subject of bitumens. Notwithstanding these facts, it is hoped that this circular will furnish highway engineers and other interested persons with a foundation for acquiring and systematically classifying further information along the lines herein indicated. To aid them in this matter a brief discussion of the value of the various materials used in road construction has been given in addition to the definitions.

Acid Sludge.—A mixture of sulphonated hydrocarbons resulting from the treatment of bitumens with sulphuric acid; usually a waste or by-product obtained in this manner from the purification of tar and oil distillates. When sufficiently concentrated these sulphonated products become viscous and gummy. They are readily attacked by water and are therefore unsuitable for use as enduring road binders.

Anthracene.—A waxy crystalline hydrocarbon having the chemical formula $C_{14}H_{10}$, found in tars, principally coal tars which have been produced at high temperatures. Anthracene is believed to be of no practical value in road binders.

Artificial Asphalt.—See Asphalts and Oil Asphalts.

Artificial Bitumens.—Hydrocarbon distillates and residues produced by the partial or fractional distillation of bitumens, and hydrocarbon distillates produced by the destructive distillation of bitumens, pyrobitumens, and other organic materials, such as wood, bone, etc. Native bitumens which have been treated merely for the removal of water and extraneous organic and inorganic materials should not be classed as artificial products, but as refined native bitumens.

Asphalts.—Solid or semisolid native bitumens, consisting of a mixture of hydrocarbons of complex structure, largely cyclic and bridge compounds, together with a small proportion of their sulphur and nitrogen derivatives, but free from any appreciable amount of solid paraffins, melting* upon the application of heat and evidently produced by nature from petroleum containing little or no solid paraffins. Solid or semisolid residues produced from probably similar oils by artificial processes are sometimes called asphalts, but should more properly be termed oil asphalts. The more common types of native asphalts are known by the name of the locality in

which they occur, such as Trinidad, Bermudez, Maracaibo, Cuban, California, etc. Native asphalts with few exceptions contain water, extraneous organic or vegetable matter, and inorganic matter, such as clay, sand, etc. A large proportion of these impurities is removed by a rough refining process without otherwise changing the character of the asphalt.

Native asphalts are usually too hard to be used as road binders without first fluxing them with a heavy petroleum residuum and thus producing an asphaltic cement. Artificial asphalts are, as a rule, brought to suitable consistency during the process of manufacture.

Asphaltenes.—A term commonly applied to those hydrocarbons in petroleum, petroleum products, malthas, asphaltic cements, and solid native bitumens which are soluble in carbon bisulphide but insoluble in paraffin naphtha. As a rule paraffin naphthas of different specific gravities and boiling points dissolve different amounts of hydrocarbons in a given bitumen, and the heavier the naphtha and the higher its boiling point the greater is its solvent action. It is evident, therefore, that the percentage of asphaltenes will vary with the gravity and boiling point of the naphtha, and for this reason it would seem well to substitute for the term asphaltenes, "bitumen insoluble in paraffin naphtha," with a statement of the gravity of the naphtha used and the temperatures between which it boils. The presence of naphtha insoluble hydrocarbons is supposed to give body to the product in which they occur and to be accountable to a great extent for its binding value. They show no binding value, since many of them are hard and brittle, but they produce adhesive mixtures when fluxed with certain heavy oils. As a rule, for a given type of bitumen hardness increases with the percentage of bitumen insoluble in a given naphtha. The so-called asphaltenes are not found to any extent in native bitumens with a paraffin base, but occur principally in asphalts, malthas, asphaltic petroleum, and in blown petroleum residues. They vary chemically and physically with the products in which they occur, and, therefore, do not represent definite chemical compounds.

Asphaltic Petroleum.—Asphaltic petroleum, or asphaltic oils, are petroleum containing an asphaltic base, i. e., they are capable of producing residues very similar to native asphalts if evaporated or distilled down to the consistency of such asphalts. They contain little or no solid paraffins and are thus differentiated from paraffin petroleum. Native asphalts are probably produced from such oils by natural processes.

Asphaltic Cement.—The term asphaltic cement was originally applied to a product obtained by fluxing an asphalt with a sufficient quantity of heavy residual oil or flux to produce a binder of suitable consistency for paving purposes. In its broadest sense it may be applied to all semisolid bitumens of an asphaltic nature which are of suitable consistency for use as binders in street or road construction, whether prepared by fluxing a solid native or artificial bitumen or by reducing an asphaltic or semiasphaltic petroleum by distillation or other process.

Baumé Gravity.—An arbitrary scale of specific gravity or density of liquids, usually expressed as degrees Baumé or ° B. This scale is commonly used in connection with oil products. For liquids lighter than water the scale begins at 10° B., which represents the specific gravity of water, or 1.0000. As the Baumé degrees increase the specific gravity decreases. The following formulæ are used in converting Baumé degrees for liquids lighter than water into direct specific gravity and vice versa:

$$\text{Sp. gr.} = \frac{140}{130 + ^\circ \text{B}} \text{ at } 17.5^\circ \text{ C.}$$

$$^\circ \text{B} = \frac{140}{\text{Sp. gr.}} - 130 \text{ at } 17.5^\circ \text{ C.}$$

For liquids heavier than water the scale begins at 0° B., which represents the specific gravity of water, or 1.0000. In this scale the degrees Baumé increase with the specific gravity. The following formulæ are used in converting Baumé degrees for liquids heavier than water into direct specific gravity and vice versa:

$$\text{Sp. gr.} = \frac{145}{145 - ^\circ \text{B}} \text{ at } 15.5^\circ \text{ C.}$$

$$^\circ \text{B} = 145 - \frac{145}{\text{Sp. gr.}} \text{ at } 15.5^\circ \text{ C.}$$

*See Bitumens.

Benzol.—A volatile colorless fluid hydrocarbon of characteristic odor having the chemical formula C_6H_6 . It occurs mainly in crude coal tars and water-gas tars, and boils at $80.4^\circ C$, so that it is removed in the first fraction when these tars are subjected to the process of distillation. Benzol is an active solvent for most bitumens. It is sometimes called benzene, but should not be confused with benzine, which is the term applied to the lighter and more volatile fractions of petroleum.

Bitumen.—Bitumens are mixtures of native or pyrogenetic hydrocarbons and their derivatives, which may be gases, liquids, viscous liquids, or solids. If solids, they melt more or less readily upon the application of heat and are soluble in carbon bisulphide, chloroform, and similar solvents. They may be divided into two main classes: (1) native bitumens and (2) artificial bitumens. Bitumens, being mixtures of hydrocarbons, can have no melting point, although this term is often used to denote the temperature at which they soften sufficiently to flow.

Bituminous.—A term applied not only to materials or objects which contain bitumen, such as bituminous rock, bituminous macadam, etc., but also to certain pyro-bitumens, such as bituminous coal, which give rise to the formation of bitumens upon being subjected to the process of destructive distillation.

Blown Petroleum.—Blown petroleum, which are often called blown oils, are petroleum residuums through which a jet of air has been passed during or just after distillation. The blowing process causes certain chemical reactions of a complicated nature to take place and results in thickening or increasing the consistency of the oil to an extent depending upon its temperature and the amount of blowing which it receives. Semi-solid and solid products are thus often formed from fluid residuums. If the oil is asphaltic or semiasphaltic in nature, asphaltic cements may be produced in this manner. Blown oils are characteristically short or nonductile when semi-solid, although they may possess considerable binding value if not originally of a paraffin nature. Blowing an oil usually increases its percentage of hydrocarbons insoluble in any given paraffin naphtha.

Carbenes.—A term commonly applied to those hydrocarbons in petroleum, petroleum products, malthas, asphaltic cements, and solid native bitumens which are soluble in carbon bisulphide but insoluble in carbon tetrachloride. The presence of an appreciable amount of these hydrocarbons indicates that the material in which they occur has been subjected to unnecessarily high temperatures. Cracked oil residuums show an increase in carbenes in proportion to the extent of cracking and the formation of these products is evidently a near step to coking. But little is known of their effect upon the value of a bitumen for road construction, but they are generally looked upon with suspicion and, in certain specifications for asphaltic cements, their presence has been limited to a low percentage.

Carbon Bisulphide.—This substance, sometimes called carbon disulphide, is a volatile and extremely inflammable compound of carbon and sulphur, boiling at $47^\circ C$, and having the chemical formula CS_2 . Pure carbon bisulphide is a colorless mobile liquid having an ethereal odor. It is one of the most active solvents for bitumens and is commonly employed for this purpose in the determination of total bitumen.

Carbon Tetrachloride.—A volatile non-inflammable compound of carbon and chlorine, boiling at $76^\circ C$. It is a colorless mobile liquid with an odor similar to that of chloroform, to which it is closely related, and has the chemical formula CCl_4 . It is an excellent solvent for bitumens, but is not usually as powerful as carbon bisulphide. It is employed in bitumen analysis for the determination of carbenes or hydrocarbons soluble in carbon bisulphide but insoluble in carbon tetrachloride.

Coal Tar.—A mixture of hydrocarbon distillates, mostly unsaturated ring compounds, produced in the destructive distillation of coal. Crude coal tar is a black, more or less viscid fluid having a gassy odor and varying in specific gravity from 1.10 to 1.25 and sometimes higher. It always contains a certain amount of ammoniacal water which makes it unsuitable for use as a road binder. When reduced to proper consistency by distillation, coal tar makes an excellent bituminous road binder, providing it does not carry too high percentages of free carbon and naphthalene. The composition of coal tar varies according to the coal from which it is produced and the method of distillation. Tars produced at high temperatures contain a large amount of free carbon and usually run high in naphthalene, while those produced at low temperatures carry less free carbon and as a rule less naphthalene. Low temperature coal tars are therefore most suitable for the preparation of road binders.*

Coke-Oven Tar.—Coal tar produced from by-product coke ovens in the manufacture of coke from bituminous coal. This

*See refined tar.

process of coke manufacture is essentially the same as that of coal gas. Larger charges of coal are, however, carbonized in the former, and as a rule carbonization is conducted at a lower temperature than in the manufacture of coal gas. The resulting tar therefore contains a smaller amount of free carbon, averaging from 3 to 10 per cent, and is better suited for the preparation of road binders than most gas-house coal tars.

Cracked Oil.—The term cracked oil, as applied to road binders, refers to petroleum residuums which have been overheated in the process of manufacture. Overheating causes a breaking down of certain constituents of the oil, which results first in the formation of carbenes and later of coke or free carbon. Badly cracked residuums are believed to be inferior road binders.

Cracking.—The process of breaking down a hydrocarbon molecule by the application of heat. This may result either in the formation of other hydrocarbon molecules, at least one of which is unsaturated and shows a higher ratio of carbon to hydrogen than the original molecule, or else in the disruption of the molecule into its elements, hydrogen and carbon. In the latter case the process is said to be destructive. The more volatile and chemically stable hydrocarbons can be cracked only at temperatures above their boiling points. In the distillation of oils this is accomplished by causing condensation to take place in the still and allowing the condensed oils to fall back into the residue, the temperature of which is considerably higher than their boiling points. In carbureted water-gas manufacture, oils are cracked by vaporizing them at a much higher temperature than their boiling points. The heavier oils will, however, crack at temperatures below their normal boiling points, and this is particularly true of asphaltic oils, which have to be distilled very carefully, sometimes under reduced pressure, in order to produce residuums which are not cracked.

Cut-Back Products.—Petroleum or tar residuums which are cut back, or fluxed, to the desired consistency with a distillate. Volatile distillates are employed for this purpose in the preparation of road binders, when it is desired to have the binder increase in consistency or become harder after application. In such cases a residuum of proper consistency for a road binder is cut back merely for the purpose of facilitating application.

Dead Oils.—Heavy oils distilled from tars at between 170° and $270^\circ C$, with a density greater than water. These oils, if free from naphthalene, serve as an excellent flux in the preparation of cut-back road binders from tar pitches, which are too brittle for this purpose.

Destructive Distillation.—A process of distilling organic materials in which the identity of the material distilled is destroyed, resulting in the formation of tarry distillates and a coke residue.

Dehydrated Tar.—Crude tar from which all water has been removed by distillation and mechanical contrivances known as separators.

Emulsions.—Oily substances made miscible with water through the action of a saponifying agent or soap. Petroleum and tars may be emulsified by this means and such emulsions, if properly prepared from good materials, are often serviceable in the treatment of roads. The majority of road emulsions can be considered only as dust palliatives and temporary binders.

Fixed Carbon.—The residual coke obtained upon burning hydrocarbon products in a covered vessel in the absence of free oxygen, according to an arbitrary method. As applied to bituminous road materials, the determination of fixed carbon would seem to be of value in connection with petroleum and asphaltic products only. Paraffin hydrocarbons produce little or no fixed carbon, while those of asphaltic character show a very considerable amount, depending upon the percentage of asphaltic compounds present and the consistency of the material. The fixed carbon determination therefore indicates the mechanical stability and body of such materials. It is not, however, an extremely accurate determination and should not be too strongly relied upon. Since fixed carbon is a product formed by ignition, it should not be confused with free carbon, which is a material already existing in suspension. The presence of any considerable quantity of free carbon vitiates a fixed carbon determination.

Flux.—As applied to road binders, this term covers fluid oils and tars which are incorporated with asphalts and semi-solid or solid oil and tar residuums for the purpose of reducing their consistency. Fluid petroleum residuums are commonly employed as fluxes in the preparation of asphaltic cements. A good flux produces an absolutely homogeneous bituminous mixture. Both petroleum and tar fluxes will produce such mixtures with native and artificial asphalts, but most fluid petroleum products will not flux tar pitches satisfactorily.

Free Carbon.—Organic matter in tars which is insoluble in

carbon bisulphide. This material is an inert black powder, which is held in suspension by the tar proper, and probably consists, not only of free carbon, but also of hydrocarbons extremely rich in carbon. It has no binding value and serves no useful purpose in a road binder other than to act as a filler. It gives the tar in which it occurs a false consistency, reduces the binding capacity of the tar, and probably interferes with its penetration into and absorption by the road stone or road surface. The maximum allowable limit of free carbon in road binders would seem to be about 20 per cent.

Gas-House Coal Tar.*—Coal tar produced as a by-product in the manufacture of illuminating gas from coal. The modern gas-house coal tar is usually produced at high temperatures and therefore carries a percentage of free carbon varying from 20 to 30 per cent and higher. Unless it is produced at low or medium temperatures and contains less than 20 per cent free carbon, it is not well suited for the preparation of a dust palliative or road binder by direct distillation. High-carbon tars may, however, be combined with low-carbon tars in such proportion as to produce, when distilled to proper consistency, excellent road binders carrying less than 20 per cent free carbon.

Gilsonite.—A very pure solid native bitumen possessing many of the characteristics of asphalt. It differs from most of the native asphalts by being more brittle, having a higher melting or softening point, and being much less soluble in 86° B. paraffin naphtha. When fluxed with certain petroleum residuums it produces excellent asphaltic cements. In the preparation of road binders it is extensively used for the purpose of reinforcing blown oils, with which it combines to form rubbery semisolid mixtures. Such preparations are sometimes termed mineral rubber.

Grahamite.—A pure solid native bitumen, black and brittle, which does not melt readily, but intumesces at high temperatures. It is differentiated from gilsonite and the native asphalts by the fact that it is almost insoluble in paraffin naphtha. It has been produced at high temperatures, as evidenced by the percentage of carbon which it contains, and some varieties closely approach the pyro-bitumens in characteristics. It has been used to some extent in the preparation of asphaltic cements, but up to the present has been little used in the manufacture of road binders.

High-Carbon Tars.—Tars containing a high percentage of free carbon—above 20 per cent. High-carbon tars are produced at high temperatures during the destructive distillation of coal and are of inferior quality for use as dust palliatives and road binders.

Hydrocarbons.—Chemical compounds composed of the elements hydrogen and carbon. There is practically an unlimited number of such compounds, which vary greatly in physical and chemical characteristics. Complex mixtures of hydrocarbons constitute by far the greater proportion of all bitumens.

Low-Carbon Tars.—Tars containing a low percentage of free carbon—less than 20 per cent. Low-carbon tars are produced at comparatively low temperatures during the destructive distillation of coal, and also by cracking oil vapors during the manufacture of carbureted water gas. As a rule they are more suitable than high-carbon tars for use as dust palliatives and road binders, or for the preparation of such substances.

Malthas.—Malthas are very viscous semiasphaltic or asphaltic native bitumens holding an intermediate position between the petroleum of an asphaltic nature and the native asphalts. As a rule they possess excellent binding properties. They constitute the binding material of many bituminous rocks or rock asphalts, and in this capacity often serve as valuable road binders. Many malthas have a tendency to harden rapidly when exposed to atmospheric conditions, and this property, while accountable for an increase in binding value, makes them unsuitable for use as a flux in the preparation of asphaltic cements.

Malthenes.—A term commonly applied to those hydrocarbons in petroleum, petroleum products, malthas, asphaltic cements, and solid native bitumens soluble in both carbon bisulphide and paraffin naphtha, but not readily volatile at temperatures lower than 163° C. (325° F.). This class of hydrocarbons serves as a valuable permanent fluxing medium for the so-called asphaltenes or naphtha insoluble bitumen in asphaltic cements, giving the cement any desired degree of softness when present in the right amount. It is evident, therefore, that the consistency of asphaltic bitumens, and particularly stable asphaltic cements, is largely dependent upon the relative proportion of naphtha soluble and naphtha insoluble hydrocarbons. The same objection to the use of the term "asphaltenes"† applies to the use of the term "malthenes."

Mineral Rubber.—A term sometimes applied to artificial bitumens of rubbery consistency, usually composed of a mixture of gilsonite and blown petroleum residuum.

Naphthas.—Mixtures of hydrocarbons of low boiling points occurring rarely in nature, commonly obtained from the fractional distillation of certain bitumens. When this term is applied to low-boiling coal-tar distillates, it is usually prefixed by the words "coal tar." The word "naphtha" by itself is generally applied to low-boiling petroleum products. Different grades of naphtha are differentiated not only by their boiling points but also by their specific gravities, which are commonly given in Baumé degrees. Those of very low boiling points and specific gravities are called petroleic ethers. Naphthas vary not only in the two properties above mentioned but also with the type of petroleum from which they are obtained. Those derived from paraffin petroleum are quite different chemically from naphthas obtained from asphaltic petroleum. The former are much less powerful solvents for asphaltic substances than the latter. Paraffin naphtha is used as a solvent for the separation of certain classes of hydrocarbons in asphaltic substances.

Naphthalene.—A solid crystalline highly volatile hydrocarbon occurring principally in coal tars and having the chemical formula $C_{10}H_8$. Its presence in excessive quantities in road tars is believed to be detrimental, as it possesses no binding value and gradually volatilizes from the tar, leaving it hard and brittle.

Native Bitumens.—Mixtures of hydrocarbons occurring in nature, which may be gases, liquids, viscous liquids, or solids, but if solid melting* more or less readily upon the application of heat and dissolving in carbon bisulphide, chloroform, and similar solvents. The native bitumens that are of use as road materials are petroleum, malthas, asphalts, and other solid products such as gilsonite and grahamite. Native bitumens often contain impurities such as water, inorganic matter in the form of clay, silt, sand, etc., and extraneous organic or vegetable matter.

Oil Asphalts.—Artificial oil pitches or asphaltic cements produced as a residuum in the distillation of semiasphaltic and asphaltic petroleum. Many of these products are blown and are therefore known as blown oils.

Oil Pitches.—More or less hard oil asphalts.

Oil Tars.†—Mixtures of hydrocarbon distillates, mostly unsaturated ring compounds, produced in the cracking of oil vapors at high temperatures. Oil tars are usually by-products of the manufacture of oil gas or carbureted water gas.

Paraffin Naphthas.—Naphthas consisting of a mixture of light volatile hydrocarbons of the paraffin series, ordinarily obtained as light distillates of paraffin petroleum.

Paraffin Petroleum.—Petroleum the base of which is composed principally of the paraffin or open-chain series of hydrocarbons; it is thus differentiated from asphaltic petroleum which are composed largely of cyclic or ring hydrocarbons. Paraffin petroleum and the unaltered residues produced by their distillation are of inferior value as dust palliatives and road binders.

Paraffin Scale.—Solid paraffins recovered by distillation and precipitation of the distillates of petroleum and similar materials. The percentage of paraffine in bitumen is usually determined in this manner.

Paraffine.—The term paraffine covers a number of greasy crystalline hydrocarbons of the paraffin series occurring as dissolved wax in certain classes of petroleum. When these products are recovered from petroleum they constitute the commercial product paraffine. Paraffine is believed to be detrimental to road binders in which it occurs, and it is certain that its presence in excessive amounts indicates inferiority in the binding value of the material. It is probable, however, that heavy liquid hydrocarbons of the same chemical series as solid paraffine exert a much more injurious effect.

Petrolenes.—An ambiguous term sometimes applied to those hydrocarbons described under malthenes, which are soluble in carbon bisulphide but insoluble in paraffin naphtha, and sometimes to hydrocarbons in petroleum and petroleum products volatile at or below 163° C. (325° F.). Owing to misconceptions which may occur, it would seem advisable to eliminate the use of this term.

Petroleums.—Petroleums, or mineral oils, are fluid native bitumens of variable composition, depending largely upon the locality in which they occur. There are three general types of petroleum found in the United States: (1) Paraffin petroleum, (2) semiasphaltic petroleum and (3) asphaltic petroleum. Paraffin petroleum occurs mainly in the eastern part of the United States and are typified by the Pennsylvania oils. The semiasphaltic variety occurs in the Southern and Middle Western parts of the United States. Texas is one of the main sources of this type. Asphaltic petroleum occurs in the western part of the United States, particularly in California. Petroleum, if of semiasphaltic or asphaltic character, may make excellent dust palliatives and road binders when properly treated.

*See Coal tar.

†See Asphaltene.

*See Bitumens.

†See Water-gas tar.

Petrolic Ethers.—Very light volatile naphthas obtained from petroleum.

Pitches.—Semisolid or solid residues produced in the evaporation or distillation of bitumens. This word is often prefixed by the name of the material from which it is derived, such as oil pitch, coal-tar pitch, etc. As a rule, the term pitch is confined to the harder residuums, most of which are too hard for use as road binders unless fluxed with a more fluid product.

Pyrobitumens.—Mineral organic substances which are but slightly acted upon by the solvents for the bitumens, but which, upon being subjected to destructive distillation, give rise to the formation of bitumens. Pyrobitumens are derived in nature both from bitumens and direct metamorphosis of vegetable matter. Among the former class may be mentioned Albertite and Wurtzilite, and among the latter peat, lignite and bituminous coal.

Pyrogenetic.—Originating from the action of heat. Coal tar is thus a pyrogenetic bitumen.

Reduced Petroleum or Reduced Oils.—Residual oils produced from crude petroleum by the removal of water and the more volatile oil constituents, without chemically altering the base by cracking or other means. These residues are often made by distilling the crude oil under reduced pressure. Such products are of little value for road treatment unless formed from semiasphaltic or asphaltic oils.

Refined Tar.—A more or less viscous tar which is produced by evaporation or distillation of crude tar until the residue is of the desired consistency. This term also includes blown tars and cut-back products produced by fluxing tar pitches with volatile or non-volatile distillates. Refined tars are of value both as dust palliatives and as road binders in the treatment of macadam roads. Their binding value is proportional to their hardness within certain limits.

Residual Petroleum or Residual Oils.—Heavy viscous residues produced by the evaporation or distillation of crude petroleum until at least all of the burning oils have been removed and often some of the heavier distillates as well. Residual oils grade into the artificial asphalts and oil pitches as their hardness and viscosity increase. The more fluid products, if obtained from semiasphaltic or asphaltic petroleum, serve as excellent dust palliatives and semipermanent road binders for the surface treatment of roads. The more viscous products are often suitable for the surface treatment of roads if applied hot, but are seldom of value in road construction unless produced from semiasphaltic or asphaltic oils.

Residual Tars.—Heavy viscous residues produced by the evaporation or distillation of crude tar until all of the light oils have been removed. Residual tars grade into the tar pitches as their hardness and viscosity increase. If they do not contain an excess of free carbon they are, as a rule, well adapted for use as binders in the construction of macadam roads.

Rock Asphalt or Bituminous Rock.—A term applied to a great variety of sandstones and limestones more or less impregnated with maltha. Deposits of such material are widely distributed over the United States and vary from rock which is friable and wholly dependent upon the bitumen to hold the mineral fragments together to solid rock having merely its interstices filled with bitumen. The former type is of value for use as a surface binder in the construction of roads when the maltha shows good binding value and amounts to not less than 6 per cent of the weight of rock asphalt.

Semiasphaltic Petroleum.—Semiasphaltic petroleum or semi-asphaltic oils are petroleum containing a semiasphaltic base, i.e., petroleum whose residues produced by evaporation or distillation, while composed mainly of asphaltic hydrocarbons, contain also a certain percentage of paraffin wax. They thus show a mixed base. If their percentage of heavy paraffin hydrocarbons is not excessive they may be made to produce good dust preventives and road binders.

Short.—A term applied to bituminous materials which are non-ductile.

Tar Pitches.—Semisolid or solid residual tars. Owing to the general brittleness of tar pitches, only the softer varieties are of value in their natural conditions as road binders. The harder pitches may, however, be used for this purpose if fluxed to suitable consistency with heavy or dead oil distillates of tar.

Tars.—Tars are artificial or pyrogenetic bitumens produced as distillates by the destructive distillation of bitumens, pyrobitumens and other organic material.

Water-Gas Tars.—Mixtures of hydrocarbon distillates, mostly unsaturated ring compounds, produced by cracking oil vapors at high temperatures in the manufacture of carbureted water gas. Crude water-gas tar is a thin, oily liquid having a specific gravity lying usually between 1 and 1.10. As a rule, it contains a considerable quantity of water, which is, however, largely removed by mechanical devices before the tar is placed upon the market. This water is not ammoniacal, as in the case of crude coal tars. The composition of water-gas tar varies with the character of the oil which is carbureted and with varying conditions attending the carbureting process. It always shows a low percentage of free carbon, usually less than 2 per cent, and contains little or no naphthalene unless previously used for scrubbing coal gas. Crude water-gas tar has practically no binding value and is serviceable only as a dust palliative in the surface treatment of roads. When reduced to proper consistency by distillation, however, it shows certain desirable properties for use as a road binder both for surface treatment and macadam construction. Water-gas tar may also be used in the preparation of road binders from high-carbon coal tars. When this is done the two crude tars are mixed in such proportion that when distilled to the desired consistency the mixture will contain less than the maximum limit of free carbon allowable.

PAVING IN 1910 AND 1911

Data Collected This Month from Four Hundred and Sixty Cities—Amounts of Various Kinds of Pavements Laid Last Year—What Is Contemplated This Year—Grades—Guarantees

As has been its custom for several years past, MUNICIPAL JOURNAL AND ENGINEER has collected for this number figures concerning the amount of paving done in the United States during the past year, and in addition such figures as are yet available concerning the work which the various cities are expecting to do during the year 1911. Naturally the latter figures are incomplete, since a great many of the cities have not yet decided upon what paving work they will carry out this year.

Reports were received from about 460 cities. Table No. 1 contains the figures of 350 of these, the remaining cities having replied that no paving work had been done by them during the year 1910. The other tables do not contain the additional data from all these cities, since the information was not furnished in many cases, probably because in most of these it was not available.

In obtaining this information cards were sent to the city engineers or street officials of all cities of the country, a reproduction of which card is presented herewith. We have chosen this particular card in order to call attention to the remarkable neatness with which the figures have been filled in. The cards returned to us from time to time vary in this respect, some being hardly legible or intelligible, but we believe this is the best piece of work of this kind which has reached our office.

These data show that in the cities represented approximately

1,000 miles of paving was done last year. This table includes most of the larger cities, and it is probable that fully 75 per cent of the work done is represented therein.

Reports from some of the States indicate that practically every city did more or less paving, while in other States a considerable percentage did no paving last year. Of nineteen cities in Massachusetts all report doing more or less paving, and the same is true of the seven Oklahoma cities, five Oregon cities, the three Rhode Island cities, the four Tennessee cities and the ten Connecticut cities. Of twelve California cities only one had done no work, and of the seventeen New Jersey cities only two. Of thirty-one Illinois cities seven had done no paving and three of the twenty-four in Indiana, six of the twenty-three in Iowa, four of the seventeen in Kansas, six of the thirty-one in Michigan, six of the seventeen in Minnesota, six of the nineteen in Missouri, seven of the thirty-two in Ohio, twelve of the forty-two in Pennsylvania and ten of the thirty-three in New York reported no paving during 1910.

Although but three cities of the twenty-four reporting from Indiana reported no paving, one or two references were made to the unsatisfactory paving law in that State, and it was said that had this law been more satisfactory a considerably larger amount of paving would have been done in that State during the year; and that this law would also limit to a minimum the

TABLE No. 1—PAVEMENTS LAID IN 1910

	Sheet Asphalt.	Asphalt Block.	Stone Block.	Brick or Clay Block.	Treated Wood Block.	Bit. Maca- dam or Bit. Concrete.	Plain Macadam.	Gravel.	Other Kinds.	Dust Layers.
CALIFORNIA:										
Benicia.....						23,000 Yc				
Fresno.....						1.30 Mc				
Long Beach....	2.75 Mc					5.5 M				
Los Angeles....	17.8 Mc			0.52 Mc		3.64 Mc		12.2 Mc		
Oakland.....	8.52 M			0.13 M		5.57 M	22.5 M		Hassam 0.18 M	25.00 M
Pasadena.....	0.95 Mc					3.16 Mc				13.28 Mc
San Jose.....	116,383 Yc									
Santa Cruz.....							48,700 Yc			
Santa Monica...	5,811 Yc					1 Mc			Concrete 9,333 Yc	
Stockton.....	1,000 Yc						22,000 Yc			1,500 Yc
Visalia.....	4,600 Yc									
	10,700 Yc§					43,904 Y				9 M
COLORADO:										
Boulder.....						4,000 Yc	3,000 Ym	30,000 Ym		
Denver.....	11,425 Ym§		22,706 Yc			7,315 Ym		92,368 Ym	14,133 Y	40,000 Ym
CONNECTICUT:										
Ansonia.....			670 Yc							
Greenwich.....				1,000 Yc						10 M
Hartford.....	14,488 Yc						29,178 Ym			134,000 Y
Meriden.....						0.1 M				0.5 M
Middletown....							4,530 Ym			
New London....			10,883 Yc			21,770 Ym	6,205 Ym			
Norwalk.....				5,500 Yc						
Putnam.....								0.25 Mm		
So. Norwalk....										10 Mm
Waterbury.....			2,529 Yc							
DIST. OF COLUMBIA:										
Washington....	58,552 Yc	52,402 Ycm	630 Ycm			12,090 Yc	74,244 Ycm			
	60,290 Yc§									
FLORIDA:										
Sarasota.....			3.75 Mm							
GEORGIA:										
Cartersville...						2,130 Ym	18,640 Ym			
Covington.....				800 Y						
Dublin.....				20,000 Yc						
Macon.....				57,000 Yc						
Savannah.....	140,814 Yc	217,342 Ym	88,597 Ym	350,131 Yc			14,912 Ym	21,249 Ym	174,710 Y	
IDAHO:										
Lewiston.....						66,000 Yc				
ILLINOIS:										
Batavia.....				1,693 Yc		29,799 Yc		1 M		3 blks.
Bloomington....	15,104 Yc			49,850 Yc						
Chicago.....	946,085 Yc		259,987 Yc	374,601 Yc	63,857 Yc		234,605 Yc		10,123 Yc	
Decatur.....				3 Mc	2,100 Yc					
East St. Louis..				6 Mc	1.1 Mc					
Elgin.....				25,649 Yc		4,500 Ym	8,700 Ym	11,460 Ym		16.69 Mm
							3,380 Ym			
Evanston.....				20,285 Yc		8,070 Yc	4,245 Yc			3.31 Mc
Galena.....				300 Yc						
Highland Pk....				500 Yc		29,000 Yc†	5,800 Yc			
						8,200 Yc				
Kankakee.....							2 Mm			13 Mc
Lake Forest....							1.5 Mc			
Marion.....				11,826 Yc						
Mattoon.....				12,37 Mc						
Normal.....				64,000 Yc						
Oak Park.....	18,123 Yc			35,089 Yc			16,630 Yc			24 Mm
Ottawa.....				21,000 Yc						
Paris.....				6,500 Yc				0.75 Mc		
Pontiac.....				6 Mc						
Rockford.....				1,320 Yc			2.1 Mc			6 Mm
Sterling.....				6,000 Yc						
Streator.....				2.5 Mc				2 Mm		
Taylorville....				7,896 Y						
Watseka.....						2 M				
Waukegan.....				46,000 Yc		13,700 Yc				
INDIANA:										
Anderson.....				1.86 Mc						
Bedford.....				8,873 Yc						
Bloomington....				24,000 Yc			2 Mc			
Butler.....				33,500 Yc						
Columbus.....				7,028 Yc						
Evansville.....	32,010 Yc			25,240 Yc						
Fort Wayne....	51,161 Yc	2,055 Yc		35,682 Yc		9,281 Yc				
Hammond.....				7,556 Yc		52,515 Yc	2,000 Yc			
Kokomo.....	12,620 Yc			17,904 Yc						
Logansport....	50,000 Yc			3,000 Yc				10,000 Yc		
Madison.....							13,183 Ym	15,007 Ym		22,430 Ym
Michigan City..				4,500 Yc						
Mishawaka.....						9,097 Yc				
Monticello.....						0.5 Mc				
Muncie.....				21,964 Yc						
New Albany....				14,500 Yc						
Peru.....				2.75 Mc		0.5 Mc				
Plymouth.....				1,400 Yc						
Portland.....							0.18 Mc			
South Bend....	8,551 Yc			32,503 Yc		30,101 Yc				
W. Lafayette...						10,200 Yc	16,000 Yc			

NOTE.—M = miles. Y = square yards. c = laid by contract. m = laid by municipal labor.

* Probably total pavement to date. † With concrete base. § Resurfacing ‡ Concrete base, cement grout filler.

TABLE No. 1—PAVEMENTS LAID IN 1910—Continued

	Sheet Asphalt.	Asphalt Block.	Stone Block.	Brick or Clay Block.	Treated Wood Block.	Bit. Mac- adam or Bit. Concrete.	Plain Macadam.	Gravel.	Other Kinds.	Dust Layers.
IOWA:										
Ames.....				1,262 Yc	23,473 Yc					
Burlington.....				13,522 Yc		2,927 Yc			Concrete	
Cedar Rapids.....				44,132 Yc		25,660 Yc			1,255 Yc	
Centerville.....				22,000 Yc						
Chariton.....				19,000 Yc						
Clinton.....				3,000 Yc	6,000 Yc					
Creston.....						25,096 Yc				
Dubuque.....				5,954 Yc		7,216 Yc	14,996 Yc			50,000 Ym
Grinnell.....				0.7 Mc		77,000 Yc				
Hampton.....				15,240 Yc						
Iowa City.....										
Marshalltown.....									Concrete	
Muscatine.....				23,724 Yc					1,500 Yc	
Ottumwa.....				22,000 Yc	1,200 Yc					
Perry.....					33,600 Yc	22,600 Yc		4Mm		
Sioux City.....				9,000 Y						
Waterloo.....	54,027 Yc									
KANSAS:										
Argentine.....				5,340 Yc		3,900 Yc				
Arkansas City.....				12,200 Yc			1 M	10 Mm		
Atchison.....				13,899 Yc						
Chanute.....				22,880 Yc		5,403 Yc				
Emporia.....						1.75 Mc				
Hutchinson.....				40,000 Y						
Independence.....				88,457 Yc						
Leavenworth.....				5,956 Yc						33,070 Yc
Ottawa.....				11,670 Yc					Concrete	
Pittsburg.....				30,352 Yc					9,125 Yc	
Salina.....				26,000 Yc		30,000 Yc				
Wichita.....	12.88 Mc			3.5 Mc	0.1 Mc	4.17 Mc			Concrete	
Winfield.....				19,200 Yc					0.1 Mmc	5,000 Yc
KENTUCKY:										
Louisville.....	4.77 Mc		0.49 Mc	4.40 Mc	0.26 Mc					
Maysville.....				7,000 Yc						
LOUISIANA:										
Alexandria.....				5,908 Yc		5,693 Yc		16,268 Yc		
Baton Rouge.....						28,000 Yc		4 Mm		
New Orleans.....	13.3 Mc		0.4 Mc		0.1 Mc	6.3 Mc		1.1 M	7.0 M	
Shreveport.....						7,000 Yc				
MAINE:										
Portland.....			4,831 Ym			21,561 Ym 6,398 Yc	1,847 Ym		Concrete 991 Yc	15,000 Y
MARYLAND:										
Annapolis.....				2,740 Yc						7,432 Yc
Baltimore.....	42,515 Yc		10,105 Yc	23,269 Yc		1,460 Yc	3,020 Yc			
MASSACHUSETTS:										
Arlington.....						4,500 Y	8,000 Y	2,000 Y		200,000 Y
Boston.....	479 Yc		31,862 Yc 2,059 Ym 12,095 Ym	42,591 Yc 364 Ym 6,222 Ym	3,188 Yc	4,650 Yc 22,072 Ym 10,550 Yc 4,900 Yc 0.88 Mm 5,808 Ym	73,300 Yc 7,070 Ym 1,979 Ym			5,845,178 Ym
Cambridge.....								2.5 Mm		11 Mm
Concord.....								0.1 Mm		0.62 Mm
Everett.....			6,201 Ym	1,216 Ym			1.22 Mm			
Greenfield.....							11,250 Ym	6,560 Ym	930 Ym	8,804 Ym
Haverhill.....			5,968 Yc				25,038 Yc		Hassam	
			6,559 Ym 20,400 Ym			35,129 Ym	21,081 Ym		22,821 Yc	
Lawrence.....			53,316 Yc 0.17 Mm§ 0.27 Mm 0.65 Mm†		2,187 Ym	6,875 Ym	18,600 Ym			4,922 Ym
Lowell.....							1.89 Mm	0.5 Mm		2.75 Mm
Medford.....						10,057 Ym	28,012 Ym			30 Mm
New Bedford.....			12,518 Ym			13,264 Yc	38,898 Ym			76.25 Mm
Newton.....						2 Mm				50 Mm
Somerville.....			18,083 Ymc	557 Y		1.88 Mm				Much
Springfield.....		712 Ym			6,153 Ym	35,979 Yc	86,457 Ym	34,181 Y		93,074 Ym
Waltham.....							36,925 Ym	7,265 Ym		363,682 Ym
Watertown.....										112,865 Ym
Westfield.....	8,211 Yc					8,280 Ym				
Woburn.....						10 Mm*	60 Mm*			2.5 Mm
Worcester.....			0.74 Mc 2.35 Mm			0.82 Mm	3.39 Mm			7.0 Mm
MICHIGAN:										
Albion.....						0.5 Mm				
Battle Creek.....				23,507 Ym						
Cadillac.....						1,800 Ym	4,000 Ym			
Coldwater.....				6,000 Ym						
Crystal Falls.....						17,000 Yc				
Detroit.....	219,883 Ym	5,190 Ym	20,906 Ym	176,130 Ym	26,148 Ym				Cedar block	
Dowagiac.....						7,119 Yc			150,384 Ym	
Escanaba.....							17,884 Yc	2,500 Yc	Concrete	1,855 Y
Flint.....	7,400 Yc	7,503 Yc		55,510 Yc						
Grand Rapids.....		10,516 Yc		78,222 Yc		35,786 Yc		62,879 Yc		
Holland.....				9,000 Yc						
Ironia.....				5,850 Ym						
Kalamazoo.....	9,443 Yc			14,894 Yc						
Lansing.....				18,932 Yc		7,163 Yc				
Ludington.....						1,500 Y				

NOTE.—M = miles. Y = square yards. c = laid by contract. m = laid by municipal labor.

* Probably total pavement to date. † With concrete base § Resurfacing. ‡ Concrete base, cement grout filler.

TABLE No. 1—PAVEMENTS LAID IN 1910—Continued

	Sheet Asphalt.	Asphalt Block.	Stone Block.	Brick or Clay Block.	Treated Wood Block	Bit. Maca- dam or Bit. Concrete	Plain Macadam.	Gravel.	Other Kinds.	Dust Layers.
MICHIGAN:										
<i>Continued</i>										
Manistee.....						7,776 Ym	3,982 Ym			2,800 Ym
Monroe.....				3,000 Yc						2 M
Muskegon.....						13,752 Yc				
Negaunee.....							7,000 Ym			
Petosky.....						6,000 Yc				
Pontiac.....				15,000 Yc				5,000 Ym		
Port Huron.....				4,590 Yc						
Saginaw.....	22,042 Yc			26,240 Yc						25,901 Y
St. Joseph.....				2,500 Y						
Sault St. Marie.....						5,080 Ym	14,000 Ym			
MINNESOTA:										
Albert Lea.....				4,770 Yc	44,017 Yc		4,445 Ym	75,000 Ym		1,871 Mm
Alexandria.....								$\frac{3}{4}$ Mm		
Crookston.....								13,300 Y		
Little Falls.....					1,444 Y					
Mankato.....				21,245 Y						7,000 Y
Minneapolis.....			30,488 Ym	4,568 Ym	155,921 Ym	62,394 Ym				
New Ulm.....								15,300 Yc		
Red Wing.....			1,844 Yc	3,383 Yc	4,381 Yc					
St. Paul.....	2.21 Mc§		0.41 M	0.42 M			4.47 M			305,000 Y
So. St. Paul.....							0.6 Mc			
Winona.....				5,005 Yc						29,155 Yc
MISSISSIPPI:										
Vicksburg.....	2.25 Mc			0.75 Mc						
MISSOURI:										
Butler.....				0.75 Mc						
Cape Girardeau.....				6,168 Yc	15,000 Yc	1 M	1.5 M			
Columbia.....				34,170 Yc						5,650 Yc
De Soto.....							2,000 Ym	2,000 Ym		
Fulton.....						7,600 Y				8,400 Y
Jefferson City.....							8,266 Yc			
Liberty.....				9,544 Yc						
Mexico.....				13,005 Yc						
Moberly.....				1.25 Mc						
St. Joseph.....	26,085 Yc		1,914 Yc	21,034 Yc	1,300 Yc	6,000 Yc	458 Yc		Hassam	218,410 Ym
St. Louis.....	88,986 Yc		33,898 Yc	298,034 Yc	27,939 Yc	60,120 Yc	23,936 Yc		88,017 Yc	
Sedalia.....	2.5 Mc			10.5 Mc			8.5 Mc			
Webb City.....				710 Yc		22,574 Yc		9,614 Yc		
MONTANA:										
Billings.....				32,505 Yc	36,614 Yc				Concrete	
Bozeman.....									3,313 Yc	
Butte.....			1,190 Yc	2,300 Yc						
Helena.....				1,848 Yc						
NEBRASKA:										
Lincoln.....	27,954 Yc			16,227 Yc						
Norfolk.....				23,280 Yc						
So. Omaha.....	20,219 Yc			25,526 Yc	14,742 Yc	38,174 Yc				
York.....				2 Mc						
NEVADA:										
Reno.....	18,000 Yc					23,000 Ym	20,000 Ym	60,000 Ym		
NEW HAMPSHIRE:										
Concord.....							$\frac{1}{4}$ M	$\frac{3}{4}$ M		1 $\frac{1}{2}$ M
Keene.....				6,700 Yc			1.5 Mmc			
Laconia.....			1,667 Ym			13,969 Ymc				20,000 Ym
NEW JERSEY:										
Bayonne.....	41,203 Yc			8,874 Yc		15,854 Yc				15 Mm
Bloomfield.....							14,455 Yc			
Boonton.....							5 Mm			
Camden.....	19,357 Yc		2,531 Yc							1 M
Dover.....										
East Orange.....	1.4 Mc	1.4 Mc				2.4 Mc	66,766 Ym			26.8 M
Elizabeth.....			1.15 Mc	0.95 Mc						16 Mc
Glen Ridge.....							4,600 Yc			5 M
Montclair.....						16,860 Y	1.5 M			25 M
Newark.....		0.11 Mc	4.47 Mc	4.60 Mc		0.73 Mc	0.65 Mc			
Paterson.....	7,082 Yc		3,400 Yc		27,035 Yc		25,000 Yc			11,000 Ym
Phillipsburg.....						2,000 Ym	5,000 Ym§			0.5 Mm
Rutherford.....						0.5 Mc	1.5 Mc			
Summit.....							1,800 Yc			
W. New York.....				7,000 Yc						
NEW YORK:										
Albany.....			3,249 Yc	22,167 Yc						15 Mm
Auburn.....	3,000 Yc						3 Mm			
Binghamton.....				33,214 Yc						
Corning.....				11,455 Yc		8,314 Yc				
Dunkirk.....	18,000 Yc			1,200 Yc						
Fishkill L'd'g.....				7,012 Yc						
Fulton.....				3,310 Yc		13,215 Yc				
Herkimer.....				0.33 Mc		0.75 Mc		0.75 Mm		
Hudson.....							11,200 Ym			5 M
Kingston.....				27,000 Yc						
Middletown.....				0.75 Mm			2 Mm	2 Mm		
New York.....										
Bronx.....	0.95 Mc	6.06 Mc	0.49 Mc							
Manhattan.....	10.39 Mc	5.75 Mc	6.95 Mc		3.57 Mc					
Richmond.....		11,947 Yc	6,450 Yc	39,628 Yc	12,957 Yc	54,441 Ym	136,754 Ym		Slag block	306,703 Ym
Niagara Falls.....		17,726 Yc	1,485 Yc			12,950 Yc			6,680 Yc	
Oreonta.....				25,410 Ym					Hassam	
Poughkeepsie.....							24,000 Ym		12,055 Yc	

NOTE.—M = miles. Y = square yards. c = laid by contract. m = laid by municipal labor.

* Probably total pavement to date. † With concrete base. ‡ Resurfacing. § Concrete base, cement grout filler.

TABLE No. 1—PAVEMENTS LAID IN 1910—Continued

	Sheet Asphalt.	Asphalt Block.	Stone Block.	Brick or Clay Block.	Treated Wood Block	Bit. Maca- dam or Bit. Concrete.	Plain Macadam.	Gravel.	Other Kinds.	Dust Layers.
NEW YORK:										
<i>Continued</i>										
Rochester.....	4.27 Mc	.....	0.27 Mc	4.64 Mc 7,268 Yc	3,300 Yc	1 Mc	.....	.....	.....	.....
Salamanca.....	.....	.....	.....	1,356 Ym 6,317 Yc	.....	.....	.....	.....	.....	.....
Schenectady.....	142,526 Yc	.....	.....	3.30 Mc	.....	.....	.....	.....	.....	.....
Syracuse.....	2.39 Mc	.....	.....	1,880 Yc	.....	.....	4,419 Yc	.....	.....	.....
Troy.....	4,219 Yc	.....	16,369 Yc	.....	.....	.....	.....	.....	.....	.....
Utica.....	41,822 Yc	.....	.....	.....	2,315 Yc 6,500 Yc	1 Mm	4 Mm	.....	.....	2 Mm
Watertown.....	.....	.....	5,000 Yc	.....	.....	.....	.....	.....	.....	.....
Watervliet.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
NORTH CAROLINA:										
Asheville.....	.....	.....	.....	.....	.....	46,760 Yc	.....	.....	.....	10,220 Yc 0.2 Mm
Raleigh.....	1 Mc	.....	.....	1 M	.....	.....	.....	.....	.....	.....
NORTH DAKOTA:										
Grand Forks.....	.....	.....	.....	.....	16,541 Yc	58,380 Yc	.....	.....	Blome 20,756 Yc	.....
Valley City.....	.....	.....	.....	.....	.....	.....	2,000 Yc	.....	.....	2,000 Yc
OHIO:										
Ashtabula.....	.....	.....	.....	23,115 Yc	.....	.....	.....	.....	.....	.....
Bellefontaine.....	.....	.....	.....	19,300 Yc	.....	.....	4,700 Yc 0.5 Mc	.....	.....	.....
Bowling Green.....	.....	.....	.....	.....	.....	.....	.....	.....	Concrete 0.21 Mc	0.5 Mc
Bucyrus.....	.....	.....	.....	2.0 Mc	.....	.....	0.82 Mm	.....	0.3 M	.....
Cincinnati.....	0.42 M	.....	5.6 M	3.12 M	2.6 M	.....	2.56 M	.....	.....	.....
Cleveland.....	0.61 M	.....	0.62 M	16.34 M	.....	.....	.....	.....	.....	.....
Columbus.....	27,892 Y	.....	.....	154,908 Y	.....	.....	0.43 M	.....	.....	.....
Coshocton.....	.....	.....	.....	0.57 Mc	.....	.....	.....	.....	.....	.....
Delaware.....	.....	.....	.....	14,000 Yc	.....	.....	.....	.....	.....	.....
E. Palestine.....	.....	.....	.....	1.25 Mc	.....	.....	.....	.....	.....	.....
Hamilton.....	.....	.....	.....	7,300 Yc	.....	.....	.....	.....	.....	.....
Lancaster.....	.....	.....	.....	21,000 Yc	.....	.....	.....	.....	.....	.....
Leetonia.....	.....	.....	.....	11,000 Yc	.....	.....	.....	.....	.....	.....
Lima.....	.....	.....	.....	13,000 Yc	.....	.....	.....	.....	.....	.....
Lockland.....	.....	.....	.....	4,274 Yc	.....	.....	.....	.....	.....	.....
Marietta.....	.....	.....	.....	35,310 Yc	.....	.....	.....	.....	.....	.....
Newark.....	.....	.....	.....	0.85 M	.....	.....	.....	.....	.....	.....
Oberlin.....	.....	.....	.....	1,475 Yc	.....	.....	.....	.....	.....	2,000 Yc
Painesville.....	.....	.....	.....	4,100 Yc	.....	.....	.....	.....	.....	.....
Portsmouth.....	.....	.....	.....	64,577 Yc	.....	.....	.....	.....	.....	.....
Sandusky.....	21,208 Yc	.....	.....	3,142 Yc	.....	.....	3,000 Ym	.....	.....	5 Mm
Springfield*.....	2.83 Mc	1.26 Mc	0.59 Mc	11.51 Mc	0.02 Mc	.....	17.48 Mc	48.09 Mc	.....	.....
Van Wert.....	.....	.....	.....	19,835 Yc	.....	.....	.....	.....	.....	10 Mm
Warren.....	.....	.....	.....	4,200 Yc	.....	.....	.....	.....	.....	.....
Zanesville.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
OKLAHOMA:										
Bartlesville.....	.....	.....	.....	15,000 Yc	.....	18,451 Yc	.....	.....	.....	.....
Chickasha.....	98,458 Yc	.....	.....	.....	.....	.....	.....	.....	.....	.....
Durant.....	.....	.....	.....	26,000 Yc	.....	.....	.....	.....	.....	.....
El Reno.....	137,021 Yc	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lawton.....	100,000 Yc	.....	.....	.....	.....	.....	.....	.....	.....	.....
Muskogee.....	8 Mc	.....	.....	1 Mc	.....	1 Mc	2 Mc	.....	.....	.....
Tulsa.....	21.8 Mc	.....	.....	1.2 Mc	.....	.....	0.2 Mc	.....	.....	.....
OREGON:										
Albany.....	.....	.....	.....	.....	.....	20,497 Yc	.....	.....	.....	.....
Baker.....	.....	.....	.....	.....	.....	66,522 Yc	.....	.....	.....	.....
Grant's Pass.....	.....	.....	.....	.....	.....	42,000 Yc	16,000 Y	.....	.....	.....
Oregon City.....	.....	.....	.....	.....	.....	.....	3 M	.....	.....	3 M
The Dalles.....	.....	.....	.....	.....	.....	37,500 Yc	.....	.....	.....	.....
PENNSYLVANIA:										
Allentown.....	32,900 Yc	.....	.....	3,080 Yc	.....	.....	.....	.....	.....	60,000 Ym
Bethlehem.....	.....	.....	.....	.....	.....	2,000 Ym	400,000 Ym*	.....	.....	50,000 Ym
Carlisle.....	.....	.....	.....	3,000 Ym	.....	.....	10,000 Ym	.....	.....	.....
Easton.....	.....	.....	.....	1,712 Yc	.....	8,924 Ym	2,712 Ym	.....	.....	.....
Erie.....	56,214 Yc	.....	.....	38,148 Yc	.....	.....	.....	.....	.....	.....
Gallitzin.....	.....	.....	.....	8,000 Yc	.....	.....	.....	.....	.....	.....
Girardville.....	.....	.....	.....	5,600 Yc	.....	.....	.....	.....	.....	.....
Harrisburg.....	17,876 Yc	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lansford.....	.....	.....	.....	9,460 Yc	.....	.....	.....	.....	.....	.....
Lebanon.....	.....	.....	.....	.....	.....	.....	38.46 Mm*	.....	.....	.....
McKeesport.....	.....	.....	.....	10,941 Yc	.....	.....	.....	.....	.....	.....
McKees Rocks.....	.....	.....	350 Yc	11,150 Yc	.....	.....	.....	.....	.....	.....
Minersville.....	.....	.....	.....	11,604 Yc	.....	.....	.....	.....	.....	3,000 Ym
New Castle.....	.....	.....	.....	2 Mc	.....	.....	.....	.....	.....	.....
Norristown.....	.....	.....	.....	1,500 Ym	.....	.....	2,400 Ym	.....	.....	.....
No. Braddock.....	.....	.....	.....	2,126 Yc	.....	.....	.....	.....	.....	.....
North East.....	.....	.....	.....	1 M	.....	.....	.....	.....	.....	.....
Oil City.....	.....	.....	.....	47,021 Yc	.....	.....	.....	.....	.....	.....
Philadelphia.....	25.0 Mc	.....	0.1 Mc	2.2 Mc	0.7 Mc	2.7 Mc	6 Mc	.....	.....	.....
Pottstown.....	.....	.....	.....	6,265 Ym	.....	.....	.....	.....	.....	.....
Punxsutawney.....	.....	.....	.....	1,794 Yc	.....	.....	.....	.....	.....	.....
Reading.....	.....	.....	0.08 Mc	0.62 Mc	.....	0.21 Mm	0.86 Mm	.....	.....	0.09 Mm
St. Mary's.....	.....	.....	.....	.....	.....	0.14 Mc	.....	.....	.....	.....
Scranton.....	59,419 Yc	.....	6,554 Yc	6,500 Ym	.....	.....	.....	.....	.....	.....
Sharon.....	.....	.....	.....	2,000 Yc	.....	.....	.....	.....	.....	.....
Shenandoah.....	.....	.....	2,000 Yc	.....	.....	.....	.....	.....	.....	.....
So. Bethlehem.....	.....	.....	.....	.....	.....	1,240 Ym	.....	.....	.....	.....
Tyrone.....	.....	.....	.....	4,700 Yc	.....	.....	.....	.....	.....	.....
Wilkes-Barre.....	9,382 Yc	.....	998 Yc	8,793 Yc	.....	.....	.....	.....	.....	.....
Williamport.....	.....	.....	.....	6,900 Yc	.....	.....	.....	.....	.....	.....
RHODE ISLAND:										
Pawtucket.....	.....	.....	8,980 Ym	457 Ym	.....	0.75 Mm	1.56 Mm	0.25 Mm	.....	59.5 Mm
Providence.....	.....	.....	1,150 Y	.....	.....	.....	2.94 Mm	.....	.....	28.81 Mc
Woonsocket.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

NOTE.—M = miles. Y = square yards. c = laid by contract. m = laid by municipal labor.

* Probably total pavement to date. † With concrete base. § Resurfacing. ‡ Concrete base, cement grout filler.

TABLE No. 1—PAVEMENTS LAID IN 1910—Continued

	Sheet Asphalt.	Asphalt Block.	Stone Block.	Brick or Clay Block.	Treated Wood Block.	Bit. Maca- dam or Bit. Concrete	Plain Macadam.	Gravel.	Other Kinds.	Dust Layers.
SOUTH CAROLINA:										
Columbia.....						1.8 Mc	6 Mm		Sand Clay 78 Mm*	
Greenwood.....			400 Y	25,000 Y					0.5 Mm	
Orangeburg.....				5,500 Ym						
SOUTH DAKOTA:										
Aberdeen.....					20,546 Yc					
Lead.....						2,500 Ym				
Sioux Falls.....			3,400 Yc							
TENNESSEE:										
Bristol.....					1,900 Y		1 M			0.5 M
Clarksville.....							1.25 Mm	3,000 Ym		1 Mm
Knoxville.....				1,400 Yc			4 Mm		300 Ym	1 Mm
TEXAS:										
Austin.....				0.2 Mc						
Denison.....				3,431 Ym						
San Antonio.....						84,070 Ym		14 Mm		
Waco.....				5,060 Yc		18,000 Yc		25,000 Ym		20,000 Ym
UTAH:										
Ogden.....	19,121 Yc									
Salt Lake.....	8.58 Mc									
VERMONT:										
Barre.....							13,485 Ym			
St. Albans.....						4,011 Yc	25,500 Ym	4,444 Ym		5,268 Ym
VIRGINIA:										
Danville.....						28,500 Yc				
Hampton.....		1,800 Yc		31,000 Yc					Shell	
Norfolk.....	35,000 Yc	9,100 Yc	24,000 Ymc		27,000 Yc	158,125 Yc	2,000 Yc		10,000 Ym 16,000 Ym	
WASHINGTON:										
Bellingham.....	22,949 Yc			11,332 Yc				3.07 Mc	Plank	
No. Yakima.....	48,000 Yc			14,000 Yc					0.62 M	
Seattle.....	344,537 Yc		52,500 Yc	118,808 Yc	694 Yc				Concrete	
Spokane.....	10.63 Mc			3.19 Mc		2.75 Mc			2.39 Mc	
Tacoma.....	257,492 Yc		18,148 Yc	58,094 Yc			1,291 Yc		3.15 Mc	
WEST VIRGINIA:										
Martinsburg.....							2 Mm			
WISCONSIN:										
Appleton.....	25,700 Yc								Concrete	
Baraboo.....							3,500 Ym		18,871 Yc	
Beloit.....				45,000 Yc	1,200 Ym					
Burlington.....				12,058 Y				4,200 Y		
Chippewa Falls.....				2,000 Yc					Concrete	
Fond du Lac.....									44,296 Yc	
Ft. Atkinson.....						3,100 Y	2,100 Y	5,200 Y		1 M
Kenosha.....				10,737 Y						
La Crosse.....				1,287 Yc						
Menomonie.....						12,548 Yc				
Portage.....							1 Mm			
Racine.....	39,718 Yc			19,383 Yc					1,404 Yc	
Watertown.....				11,352 Yc	325 Yc	2,000 Ym				
Waukesha.....				4,892 Yc		43,938 Yc				
WYOMING:										
Laramie.....								1 M		

NOTE.— M = miles. Y = square yards. c = laid by contract. m = laid by municipal labor

* Probably total pavement to date. † With concrete base. § Resurfacing. ‡ Concrete base, cement grout filler.

TABLE No. 2—PAVEMENT WHICH IT IS INTENDED TO LAY IN 1911

City	Sheet Asphalt.	Asphalt Block.	Stone Block.	Brick or Clay Block.	Treated Wood Block.	Bit. Maca- dam or Bit. Concrete.	Plain Macadam.	Gravel.	Other Kinds.	Dust Layers.
ARIZONA:										
Phoenix.....	5 M						10 M			
CALIFORNIA:										
Benicia.....						86,000 Y				
Fresno.....						1 M				
Long Beach.....	3 M					5 M				
Los Angeles.....	25 M					10 M		20 M		
Oakland.....	10 M					15 M	30 M			
Pasadena.....	0.18 M			0.42 M		9.72 M				3.04 M
San Jose.....	3.5 M								Bit. Rock	
Santa Cruz.....									6,000 Y	
Santa Monica.....	25,000 Y			50,000 Y		2 M				
Stockton.....							100,000 Y			57,000 Y
Visalia.....						16,000 Y				
COLORADO:										
Boulder.....						12,000 Y		25,000 Y		
Denver.....	40,000 Y				6,000 Y	22,000 Y	15,000 Y			
Longmont.....						15,000 Y		10,000 Y		10,000 Y
Pueblo.....						55,960 Y				

TABLE No. 2—PAVEMENT WHICH IT IS INTENDED TO LAY IN 1911—Continued

City	Sheet Asphalt.	Asphalt Block.	Stone Block.	Brick or Clay Block.	Treated Wood Block.	Bit. Macadam or Bit. Concrete.	Plain Macadam.	Gravel.	Other Kinds.	Dust Layers.
CONNECTICUT:										
Ansonia.....										
Hartford.....	0.5 M						2 M			
Norwalk.....							49,000 Y			750,000 Y
Putnam.....				5,500 Y				0.5 M		
FLORIDA:										
Sarasota.....			0.75 M							
GEORGIA:										
Americus.....					20,000 Y					
Cartersville.....						4,500 Y	2,900 Y			
Covington.....			800 Y							
Dublin.....				7,000 Y						
Macon.....				56,000 Y						
ILLINOIS:										
Batavia.....						6,654 Y				
Bloomington.....	1,870 Y			44,313 Y						
Chicago.....	900,000 Y		260,000 Y	375,000 Y	64,000 Y		235,000 Y			
Decatur.....				3 or 4 M						
East St. Louis.....				12 M						
Elgin.....						25,439 Y				
Evanston.....				0.5 M		0.75 M	1/2 M			20 M
Highland Pk.....						3 M††				
Kankakee.....				2 66 Y		21,300 Y				
Lake Forest.....						2 M				
Marion.....				25,000 Y		18,000 Y			Concrete	
Mattoon.....				2.5 M					2,100 Y	
Normal.....				24,000 Y						
Oak Park.....				1.5† M		1.75† M	1.5† M			
Ottawa.....				17,000 Y						30 M
Paris.....				12,000 Y						
Pontiac.....				5,746 Y						
Streator.....				1 M						
Taylorville.....				12,111 Y**		1,407 Y				
Vandalia.....				18,300 Y		4,000 Y				
Watsika.....						2 M				
Waukegan.....						37,000 Y‡‡				
INDIANA:										
Anderson.....				1 M						
Auburn.....				1,000 Y						
Bloomington.....				1.75 M						
Butler.....										
Columbus.....				20,000 Y				0.12 M		2 M
Evansville.....	30,000 Y			25,000 Y						
Fort Wayne.....	30,000 Y			27,000 Y						
Hammond.....				10,000 Y						
Kokomo.....	6,720 Y					40,000 Y	7,000 Y			
Logansport.....	1.5 M			5,000 Y						
Muncie.....				2.5 M				10,000 Y		
Peru.....				1 M						
Plymouth.....				0.4 M				1 M		
W. Lafayette.....						5,000 Y		5,000 Y		
IOWA:										
Cedar Rapids.....				60,200 Y						
Centerville.....				3,000 Y						
Clinton.....				12,000 Y						
Hampton.....				0.5 M						
Muscataine.....				2 M						
Sioux City.....	20,000 Y			5,000 Y					Concrete	
Waterloo.....	50,000 Y								50,000 Y	
KANSAS:										
Argentine.....	0.25 M			1 M						
Atchison.....				10,000 Y						
Beloit.....									Concrete	
Chanute.....				3,910 Y		22,166 Y			500 Y	
Emporia.....						2 M				
Hutchinson.....					3,000 Y					
Independence.....				47,000 Y						
Leavenworth.....				1.33 M						
Manhattan.....				12,000 Y		16,800 Y				
Ottawa.....				11,420 Y		27,750 Y				
Pittsburg.....				13,000 Y*		13,000 Y*				
Salina.....						60,000 Y				
Wichita.....				15 M						
KENTUCKY:										
Louisville.....	5.25 M		0.25 M	4.5 M						
Ludlow.....				11,500 Y						
Maysville.....				10,000 Y						
Pineville.....							1.5 M			
LOUISIANA:										
New Orleans.....	2.6 M		0.5 M		0.7 M	2.1 M			2 M	
Shreveport.....									15 M††	
MARYLAND:										
Annapolis.....						6,197 Y				
MASSACHUSETTS:										
Concord.....						1.5 M				
Greenfield.....						10,000 Y	10,000 Y	5,000 Y		20,000 Y
Haverhill.....				2,050 Y						
New Bedford.....				15,000 Y			40,000 Y			1,000,000 Y
Newton.....						3 M				50 M
Westfield.....				15,500 Y						
MICHIGAN:										
Albion.....						0.5 M				

* One or the other. ‡ Kind not decided. † Quantity not decided on.

** 8,660 yards contracted, 2 miles more petitioned for. †† With concrete base. §§ 30,000 of this is resurfacing with bituminous macadam. ‡‡ Various kinds.

TABLE No. 2—PAVEMENT WHICH IT IS INTENDED TO LAY IN 1911—Continued

City	Sheet Asphalt.	Asphalt Block.	Stone Block.	Brick or Clay Block.	Treated Wood Block.	Bit. Maca- dam or Bit. Concrete.	Plain Macadam.	Gravel	Other Kinds.	Dust Layers.
MICHIGAN:										
<i>Continued</i>										
Coldwater.....				4,200 Y						
Detroit.....	220,000 Y	5,000 Y	20,000 Y	175,000 Y	25,000 Y				Concrete	
Escanaba.....									0.5 M	
Hancock.....	3,500 Y								10,000 Y‡	
Hillsdale.....										
Holland.....						20,000 Y				
Ludington.....						11,200 Y				
Munroe.....				20,000 Y						
Negaunee.....					11,000 Y					
Petosky.....						6,000 Y			1 M§	
Port Huron.....									50,000 Y§	
Saginaw.....										
St. Joseph.....				7,500 Y*		17,000 Y	7,500 Y*			
MINNESOTA:										
Albert Lea.....					53,000 Y					
Cloquet.....						21,372 Y	5,000 Y			
Crookston.....										
Little Falls.....					1,144				Concrete	
Mankato.....				12,900 Y		6,600 Y			1,241 Y	
Minneapolis.....			22,000 Y	5,000 Y	150,000 Y	60,000 Y				3,500 Y
Montevideo.....						2,000 Y		4,000 Y		
New Ulm.....								5,750 Y		
Winona.....				7,040 Y						
MISSISSIPPI:										
Vicksburg.....									1 M§	
MISSOURI:										
Butler.....				1 M						
Columbia.....				30,000 Y						
De Soto.....							25,000 Y			
Fulton.....				10,000 Y		2,500 Y				15,000 Y
Jefferson City.....						30,000 Y*	30,000 Y*			
Liberty.....				1 M						
Moberly.....				1.5 M					Hassam	
St. Joseph.....	1.5 M					2 M			2 M	25 M
St. Louis.....	88,000 Y		26,400 Y	246,400 Y	123,400 Y	70,400 Y	70,400 Y			
Sedalia.....				36,000 Y						
Webb City.....				1,360 Y		35,000 Y				
MONTANA:										
Billings.....					20,000 Y					
Butte.....				4,000 Y						
Missoula.....				135,000 Y*	135,000 Y*	135,000 Y*				
NEBRASKA:										
Lincoln.....	32,000 Y			32,347 Y						
Norfolk.....				45,000 Y					Concrete	
South Omaha.....				82,525 Y		67,365 Y			16,045 Y	
NEW HAMPSHIRE:										
Laconia.....						15,000 Y				
NEW JERSEY:										
Bloomfield.....							5 M			20 M
Boonton.....							5 M			
Camden.....	‡		‡							
Dover.....				5,000 Y						5 M
Glen Ridge.....							1,100 Y			
Millville.....				23,000 Y						1.75 M
Montclair.....										
Newark.....	‡	‡	‡			‡				10,000 Y
Phillipsburg.....				3,600 Y			3,000 Y			
Rutherford.....						‡	2 M			
Summit.....							3,000 Y			
W. New York.....				9,000 Y						
NEW YORK:										
Albany.....				75,000 Y						
Auburn.....			3,100 Y	5,900 Y						
Binghamton.....				36,500 Y*	36,500 Y*					
Canajoharie.....				4,825 Y						
Corning.....				15,000 Y						
Dunkirk.....	28,000 Y			28,000 Y		3,000 Y				
Elmira.....	4,000 Y*			4,000 Y*	4,000 Y*					
Fishkill L'd'g.....				1,400 Y						
Fulton.....				6,500 Y						5 M
Kingston.....			9,200 Y	18,188 Y		10,691 Y			Hassam	
Niagara Falls.....		23,372 Y	12,100 Y						12,100 Y	
Poughkeepsie.....				19,000 Y	2,200 Y		35,000 Y			
Salamanca.....				8,000 Y						
Syracuse.....									3 M§	
Watertown.....				1 M*	1 M*	1.5 M*	4 M			3 M
NORTH CAROLINA:										
Asheville.....						14,000 Y				
Raleigh.....								3 M		5 M
NORTH DAKOTA:										
Grand Forks.....									50,000 Y§	
OHIO:										
Ashtabula.....			3,777 Y	22,216 Y						
Bellefontaine.....				7,000 Y						
Bowling Green.....						1.5 M				
Bucyrus.....				3,000 Y						

* One or the other. § Kind not decided. ‡ Quantity not decided on. †† With concrete base. ‡‡ Various kinds.

TABLE No. 2—PAVEMENT WHICH IT IS INTENDED TO LAY IN 1911—Continued

City	Sheet Asphalt.	Asphalt Block.	Stone Block.	Brick or Clay Block.	Treated Wood Block.	Bit. Macadam or Bit. Concrete.	Plain Macadam.	Gravel.	Other Kinds.	Dust Layers.
OHIO:										
<i>Continued</i>										
Chillicothe.....			5 M	6,800 Y	2.85 M	1 M	1 M			
Cincinnati.....			3.35 M	0.12 M						
Cleveland.....	0.5 M			30.53 M						
Coshocton.....	9,560 Y			10,000 Y						
Delaware.....				0.75 M						
E. Palestine.....				22,000 Y						
Findlay.....										
Hamilton.....	2.5 M			13,377 Y						
Leetonia.....						20,000 Y				
Lima.....	12,000 Y			29,430 Y						
Lockland.....				1,800 Y		10,000 Y				25,000 Y
Lorain.....				6,310 Y						
Marietta.....				816 Y	2,600 Y	240 Y				
Marion.....				3 M						
Newark.....				7,800 Y						
Oberlin.....				4,100 Y						
Painesville.....				1.1 M						
Pomeroy.....				47,475 Y						
Portsmouth.....				10,000 Y			3,000 Y			5 M
Sandusky.....	10,000 Y			42,000 Y*						
Springfield.....	42,000 Y*	42,000 Y*		5,000 Y						
Van Wert.....				0.5 M			1 M			10 M
Warren.....				29,477 Y						
Zanesville.....										
OKLAHOMA:										
Bartlesville.....				28,000 Y		6,200 Y				
Chickasha.....	35,000 Y			8,000 Y						
Durant.....										
El Reno.....	50,000 Y									
Lawton.....	120,200 Y			1.5 M		6 M	2 M			
Muskogee.....	3 M			2 M						
Tulsa.....	15 M									
OREGON:										
Albany.....						22,470 Y				
Baker.....						83,500 Y				
Grant's Pass.....						30,000 Y	50,000 Y	71,000 Y		3 M
Oregon City.....							4 M			4 M
The Dalles.....						58,000 Y				
PENNSYLVANIA:										
Allentown.....	27,500 Y			21,475 Y						20,000 Y
Blossburg.....				†		7,000 Y				
Carlisle.....				25,000 Y						
Erie.....	25,000 Y			25,000 Y						
Franklin.....				12,000 Y						
Girardville.....				2,055 Y						
Harrisburg.....	250,335 Y			14,500 Y						
McKeesport.....				15,000 Y						
McKees Rocks.....				11,050 Y						
Meadville.....				2 M						
New Castle.....				9,000 Y*		9,000 Y*	10,000 Y			10,000 Y
Norristown.....				27,750 Y	4,060 Y*	4,060 Y*				
Oil City.....				5,767 Y						
Punxsutawney.....				0.93 M		5 M	2 M			1 M
Reading.....				†						
St. Mary's.....				1,600 Y						
Scranton.....	87,907 Y		3,752 Y	2,000 Y						
Shamokin.....				4,000 Y						
Sharon.....				9,000 Y						
Sharpsville.....				2,500 Y						
Williamsport.....										
RHODE ISLAND:										
Pawtucket.....			2,600 Y	†		†	†			60 M
Providence.....			14,942 Y							70 M
SOUTH CAROLINA:										
Orangeburg.....				3,500 Y					Sand Clay 2 M	
SOUTH DAKOTA:										
Lead.....						0.5 M				
TENNESSEE:										
Knoxville.....	50,000 Y		4,000 Y				4 M			2 M
TEXAS:										
Austin.....				1 M		1 M				
Denison.....				3,000 Y						
San Antonio.....				15,000 Y		100,000 Y		16 M		†
Waco.....								†		
UTAH:										
Salt Lake.....	2 M									
VIRGINIA:										
Hampton.....									Shell 10,000 Y	
WASHINGTON:										
Bellingham.....	28,264 Y			12,462 Y		58,000 Y		0.62 M		
N. Yakima.....	8,000 Y			150,000 Y						
Seattle.....	220,000 Y		30,000 Y						Concrete 5.6 M	
Spokane.....	8.5 M			4.6 M		7.5 M				
WEST VIRGINIA:										
Martinsburg.....						1 M	3 M			5 M

* One or the other. † Kind not decided. ‡ Quantity not decided on. †† With concrete base. ‡‡ Various kinds.

TABLE No. 2—PAVEMENT WHICH IT IS INTENDED TO LAY IN 1911—Continued

City	Sheet Asphalt.	Asphalt Block.	Stone Block.	Brick or Clay	Treated Wood Block.	Bit. Macadam or Bit. Concrete.	Plain Macadam.	Gravel.	Other Kinds.	Dust Layers.
WISCONSIN:									Concrete 2,000 Y	
Appleton.....	25,000 Y	.....	.....	.....	.....	.....	5,000 Y	.....	.....	.....
Baraboo.....	.....	.....	.....	25,000 Y	.....	.....	.....	.....	.....	.....
Beloit.....	.....	.....	.....	3,500 Y	.....	.....	.....	.....	.....	.....
Chippewa Falls	.....	.....	.....	.....	.....	.....	.....	.....	Concrete 11,000 Y	.....
Fond du Lac ..	.....	.....	.....	9,500 Y	.....	.....	.....	.....	.....	.....
Kenosha.....	.....	.....	.....	17,000 Y	.....	14,000 Y	.....	.....	.....	.....
Menomonie.....	.....	.....	.....	.....	.....	9,000 Y	.....	.....	.....	.....
Racine.....	.....	.....	.....	44,000 Y	.....	2,324 Y	.....	.....	.....	.....
Watertown.....	.....	.....	.....	7,500 Y	.....	.....	.....	.....	.....	.....
Waukesha.....	.....	.....	.....	.....	.....	5,000 Y	.....	.....	.....	.....
WYOMING:										
Laramie.....	.....	.....	.....	.....	.....	.....	.....	2 M	.....	.....

‡ Quantity not decided on.

amount done this year.

A glance at table No. 1 shows that of the permanent pavements brick is by far the most popular, asphalt being second, wood block third, stone block fourth and asphalt block fifth. Bituminous macadam (with which are included bitulithic and bituminous concrete pavements), which may be considered as a semi-permanent pavement, is seen to have been used quite generally in all sections of the country. In fact, there would appear to have been fully as much of this kind of paving as of plain macadam during the past year.

The above statement refers to the number of cities using the pavements rather than to the total amounts of pavements laid. If the latter be made the basis of comparison, the large quantities laid by the larger cities will cause those pavements to take precedence which are most popular for streets in such larger cities. On this basis of quantity laid we find the order somewhat changed, asphalt leading, with brick a close second, after which, but with a long interval, come stone block, wood block and asphalt block in the order named.

In figuring up the total quantities of the several kinds of pavements it has been necessary to reduce all to either miles or square yards, since some officials reported the quantities in one unit and some in the other. In doing so it was necessary to make some assumption concerning the average width of roads. We have assumed this to be 36 feet, on the more or less common basis of a 60-foot street with two 12-foot sidewalks, leaving a 36-foot roadway. On this basis we find the following results:

The total amount of asphalt paving done in 1910 in the cities reporting was 341 miles; of brick, 316 miles; of stone block, 68 miles; of wood block, 36 miles, and of asphalt block, 31 miles. Of the less permanent pavements, plain macadam leads with 260 miles, bituminous macadam follows with 149 miles and gravel with 91 miles. Of the miscellaneous pavements there

were 58 miles, practically all of these being permanent pavements, of which concrete formed a considerable percentage. This gives a total of about 850 miles of permanent pavements and 500 miles of bituminous and plain macadams and gravel.

The figures for the three less permanent pavements would undoubtedly be greatly increased were the figures for county and state work included. The same also is true of the use of dust layers, which the cities reported using on about one thousand miles of streets.

BY CITY LABOR

Of this 1910 work the amount which was performed by the municipalities by day labor rather than by contract was as follows, the pavements being considered in the order of the percentage done by the municipality: Of the gravel roads 70 per cent was done by city labor, or 64 miles out of 91. Of plain macadam 61 per cent was done by day labor, or 159 miles. Of asphalt block 39 per cent was done by city labor or 12 miles. Of stone block 28 per cent was done by city labor or 19 miles. Of wood block 25 per cent was done by city labor, or 9 miles. Of bituminous macadam, bitulithic, etc., 23 per cent was done by city labor, or 34 miles. Of brick pavements 43 per cent was done by city labor, or 15 miles. The smallest percentage done by city labor was sheet asphalt, the amount being 11 miles, or 3¼ per cent of the total.

MAXIMUM GRADES

The table of grades gives the grades of the pavements which were laid in 1910, and thus is not a correct indication of the grades of all the paved streets to be found in the several cities. It is believed, however, that it is even more valuable than a statement of the grades of old as well as of new pavements, since it would seem to more probably represent the conclusions which

(Continued on page 376.)

City ST. LOUIS State MISSOURI Information furnished by JAS. C. TRAVILLA Street Commisr.

Kind of pavement	By municipality [M] or by contract [C]?	Pavements laid in 1910					Amount which it is intended to lay in 1911; Miles [M] or Square Yards [Y]	
		Amount, in Miles (M) or Square Yards (Y)		Maximum Grade	Guarantee period	Traffic light or heavy?	Estimated	
		Miles	Sq. Yds.				Miles	Sq. Yards
Sheet asphalt	Contract	4.55	88986	upto 4%	5 years	medium	5.00	88000
Asphalt block								
Granite, sandstone or other stone block	" "	2.02	33898	" " 6%	10 "	heavy	1.50	26400
Brick or clay block	Vitrified block	16.49	298034	" " 5%	5 "	medium	14.00	246400
Creosoted wood block	" "	1.81	27939	" " 3%	5 "	heavy	7.00	123400
Untreated wood block								
Bitulithic, bituminous-macadam or	" "	3.22	60120	" " 4%	5 "	medium	4.00	70400
Telford	bituminous-concrete	1.36	23936	" " 6%	none	light	4.00	70400
Plain or water bound macadam								
Gravel								
Other kinds								
Treated with dust layers								

4.00 FEET CONCRETE

4.00

FEB 23 1911

ST. LOUIS, MO.

STATIONER

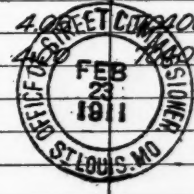


TABLE No. 3—MAXIMUM GRADES LAID IN 1910

City	Sheet Asphalt. %	Asphalt Block. %	Stone Block. %	Brick. %	Treated Wood Block. %	Bituminous Macadam. %	Plain Macadam. %	Gravel. %
CALIFORNIA:								
Long Beach.....	6							
Oakland.....	3							
Pasadena.....	1							
San Jose.....	0.4							
Santa Monica.....	1							
Visalia.....								
COLORADO:								
Boulder.....								
CONNECTICUT:								
Ansonia.....								
Greenwich.....	2.75		3	3				
Hartford.....								
Middletown.....								
New London.....			3	3				
Norwalk.....								
Putnam.....			0					
Waterbury.....								
DISTRICT OF COLUMBIA:								
Washington.....	6	6	6					
FLORIDA:								
Sarasota.....			2					
GEORGIA:								
Americus.....								
Cartersville.....				3	4			
Dublin.....				8				
Macon.....								
ILLINOIS:								
Bloomington.....	3.80			5.20				
Decatur.....				0.40				
East St. Louis.....				0.3				
Elgin.....				3.0				
Evansville.....				23.9*				
Galesburg.....				2.0				
Highland Park.....				5.3				
Kankakee.....				2.0				
Lake Forest.....				2.0				
Marion.....				0.9				
Mattoon.....				6.0				
Normal.....				4.75				
Oak Park.....				1.6				
Streator.....				10.0				
Taylorville.....								
Waukegan.....								
INDIANA:								
Bedford.....				3.0				
Bloomington.....				5.75				
Butler.....				1.0				
Evansville.....	0.5			0.5				
Fort Wayne.....	3.10	0.4		1.0				
Logansport.....	3			1				
Madison.....				0.5				
Michigan City.....				0.5				
Mishawaka.....				0.5				
New Albany.....				1.0				
Peru.....				17				
Plymouth.....								
Portland.....								
W. Lafayette.....								
IOWA:								
Ames.....				1				
Burlington.....				2				
Centerville.....				5				
IOWA—Cont.								
Chariton.....				1 1/2				
Creston.....				10				
Grinnell.....				16 1/2				
Iowa City.....				6				
Muscatine.....								
Ottumwa.....								
Perry.....								
Sioux City.....								
KANSAS:								
Argentine.....				16				
Arkansas City.....				12.73				
Chanute.....				7 1/2				
Independence.....				6 3/4				
Leavenworth.....				1.47				
Ottawa.....				1.45				
Pittsburg.....				0.25				
Salina.....				0.5				
Wichita.....				4				
Winfield.....								
KENTUCKY:								
Louisville.....			5	14	1			
Ludlow.....			3 1/2					
LOUISIANA:								
Baton Rouge.....								
Shreveport.....								
MAINE:								
Portland.....			2					
MARYLAND:								
Annapolis.....				2.62				
Baltimore.....			4.6	6.7				
MASSACHUSETTS:								
Arlington.....			0	1.5				
Cambridge.....				4.8				
Concord.....			2.8					
Everett.....			2					
Greenfield.....			3.4					
Haverhill.....			4.36					
Lawrence.....			4.5					
Lowell.....								
New Bedford.....								
Newton.....								
Springfield.....								
Waltham.....								
Westfield.....								
MICHIGAN:								
Albion.....								
Battle Creek.....				2				
Cadillac.....				0.2				
Coldwater.....								
Crystal Falls.....								
Dowagiac.....								
Escanaba.....								
Flint.....								
Grand Rapids.....				9.25				
Holland.....				0.4				
Ionia.....				0.3				
Kalamazoo.....				2				
Lansing.....				0.05				
Manistee.....								
Monroe.....								
Muskegon.....								
Petoskey.....								
Pontiac.....				3				
Port Huron.....				6				

* For foot travel only. Max. for teams, 11%. † All pavements practically level.

TABLE NO. 3—MAXIMUM GRADES LAID IN 1910—(Continued)

City	Sheet Asphalt. %	Asphalt Block. %	Stone Block. %	Brick. %	Treated Wood Block. %	Bituminous Macadam. %	Plain Macadam. %	Gravel. %
MICH.—Cont.								
Saginaw.....	0.25	.....	.....	0.25	.....	.....	.....	.....
St. Joseph.....	.....	.....	.....	1.5	.....	.....	.....	.....
Sault St. Marie.....	.....	.....	.....	.....	.....	.....	.....	.....
MINNESOTA:								
Albert Lea.....	.....	.....	.....	3	7	.....	4	14
Alexandria.....	.....	.....	.....	.....	.....	.....	.....	5.4
Crookston.....	.....	.....	.....	.....	.....	4.87	.....	2
Mankato.....	.....	.....	.....	1	4.2	.....	.....	.....
Minneapolis.....	.....	.....	.....	.....	.....	.....	.....	1
New Ulm.....	.....	.....	.....	1	1	.....	1.21	.....
Red Wing.....	.....	.....	6	.....	.....	.....	.....	.....
S. St. Paul.....	.....	.....	.....	2	.....	.....	.....	.....
Wadena.....	.....	.....	.....	.....	.....	.....	.....	.....
MISSISSIPPI:								
Vicksburg.....	8.5	.....	.....	3	.....	.....	.....	.....
MISSOURI:								
Cape Girardeau.....	.....	.....	.....	1	3	15.3	6	.....
Columbia.....	.....	.....	.....	5	.....	.....	13	1
De Soto.....	.....	.....	.....	.....	.....	6	.....	.....
Fulton.....	.....	.....	.....	.....	.....	.....	4	.....
Jefferson City.....	.....	.....	.....	8	.....	.....	.....	.....
Liberty.....	.....	.....	.....	4.5	.....	.....	.....	.....
Mexico.....	.....	.....	.....	4.2	.....	.....	.....	.....
Moab.....	.....	.....	.....	5	.....	.....	5	.....
St. Joseph.....	3	.....	2	.....	3	4	6	.....
St. Louis.....	4	.....	6	5	.....	.....	5	.....
Sedalia.....	3	.....	.....	4	.....	6	.....	4
Webb City.....	.....	.....	.....	1	.....	.....	.....	.....
MONTANA:								
Billings.....	.....	.....	.....	0.7	0.05	.....	.....	.....
Butte.....	.....	.....	1	5	.....	.....	.....	.....
Helena.....	.....	.....	.....	1.4	.....	.....	.....	.....
NEBRASKA:								
Lincoln.....	4	.....	.....	4	.....	.....	.....	.....
Norfolk.....	4	.....	.....	0.33	8	.....	.....	.....
S. Omaha.....	.....	.....	.....	6	.....	.....	.....	.....
NEW HAMPSHIRE:								
Keene.....	.....	.....	.....	0	.....	.....	0	.....
Laconia.....	.....	.....	3	.....	.....	4	.....	.....
NEW JERSEY:								
Bayonne.....	0.1	.....	.....	0.1	.....	0.1	.....	.....
Bloomfield.....	.....	.....	.....	.....	.....	.....	6	.....
Boonton.....	.....	.....	.....	.....	.....	.....	10	.....
Camden.....	3	.....	4	2	.....	.....	.....	.....
Dover.....	.....	.....	.....	.....	.....	7.4	0.48	.....
East Orange.....	6.8	4	2	1	.....	.....	.....	.....
Elizabeth.....	.....	.....	.....	.....	.....	4.35	2	.....
Glen Ridge.....	.....	.....	.....	7.5	.....	.....	3	.....
Newark.....	1	0.5	7	6	3	13	12	.....
Paterson.....	.....	.....	1	.....	.....	4	6	.....
Phillipsburg.....	.....	.....	.....	.....	.....	.....	2	.....
Rutherford.....	.....	.....	.....	1.2	.....	.....	.....	.....
Summit.....	.....	.....	.....	.....	.....	.....	.....	.....
West New York.....	.....	.....	.....	.....	.....	.....	.....	.....
NEW YORK:								
Auburn.....	1.2	.....	.....	.....	.....	.....	4	.....
Binghamton.....	.....	.....	.....	1	.....	.....	.....	.....
Corning.....	.....	.....	.....	0.3	.....	.....	.....	.....
Fishkill Landing.....	.....	.....	.....	2	.....	4	.....	.....
Fulton.....	.....	.....	.....	1	.....	3	.....	.....
Herkimer.....	.....	.....	.....	0.5	.....	0.5	.....	.....
Hudson.....	.....	.....	.....	.....	.....	.....	4.5	.....
Kingston.....	.....	.....	.....	4	.....	.....	.....	.....
Middletown.....	.....	.....	.....	5	.....	.....	.....	.....

TABLE NO. 3—MAXIMUM GRADES LAID IN 1910—(Continued)

City	Sheet Asphalt. %	Asphalt Block. %	Stone Block. %	Brick. %	Treated Wood Block. %	Bituminous Macadam. %	Plain Macadam. %	Gravel. %
New York, Bronx.....	3	6	6+	.....	2.5	.....	.....	.....
New York, Manhattan.....	.....	.....	.....	.....	2	.....	.....	.....
New York, Richmond.....	.....	.....	.....	6	2	5	6	.....
Niagara Falls.....	.....	.....	.....	3.5	.....	0.5	.....	.....
Olean.....	.....	.....	.....	1.2	.....	.....	.....	.....
Poughkeepsie.....	.....	.....	.....	.....	.....	.....	.....	.....
Salamanca.....	.....	.....	.....	.....	.....	.....	.....	.....
Schenectady.....	2	.....	2.3	.....	.....	.....	.....	.....
Syracuse.....	5.1	.....	.....	5.8	.....	.....	.....	.....
Troy.....	1.5	.....	3	1	.....	.....	16.2	.....
Watertown.....	.....	.....	1	.....	4	1	5	.....
NORTH CAROLINA:								
Asheville.....	1	.....	.....	.....	.....	12	.....	.....
Raleigh.....	.....	.....	.....	.....	.....	.....	.....	.....
OHIO:								
Ashtabula.....	.....	.....	18	5	.....	.....	.....	.....
Bellevue.....	.....	.....	.....	9	.....	.....	.....	.....
Bucyrus.....	.....	.....	.....	2	.....	.....	.....	.....
Cincinnati.....	3	.....	4	5	4	4	1	.....
Coshocton.....	.....	.....	.....	.....	.....	.....	8	.....
Delaware.....	.....	.....	.....	4.5	.....	.....	.....	.....
E. Palestine.....	.....	.....	.....	.....	.....	.....	.....	.....
Hamilton.....	.....	.....	.....	0.5	.....	.....	.....	.....
Lincoln.....	7	.....	.....	5	.....	.....	.....	.....
Leetonia.....	.....	.....	.....	.....	.....	.....	.....	.....
Lima.....	.....	.....	.....	1	.....	.....	.....	.....
Lockland.....	.....	.....	.....	1.85	.....	.....	.....	.....
Lorain.....	.....	.....	.....	0.3	.....	.....	.....	.....
Marietta.....	.....	.....	.....	5.5	.....	.....	.....	.....
Newark.....	.....	.....	.....	0.4	.....	.....	.....	.....
Oberlin.....	.....	.....	.....	4.4	.....	.....	.....	.....
Painesville.....	.....	.....	.....	0.5	.....	.....	.....	.....
Portsmouth.....	.....	.....	.....	8.8	.....	.....	.....	.....
Sandusky.....	2	.....	.....	1	.....	.....	.....	.....
Springfield.....	3.8	5.1	2.1	7.6	.....	.....	17.0	.....
Van Wert.....	.....	.....	.....	1.0	.....	.....	.....	.....
Zanesville.....	.....	.....	.....	2	.....	.....	.....	.....
OKLAHOMA:								
Barlesville.....	.....	.....	.....	3	.....	3	.....	.....
Chickasha.....	6.5	.....	.....	.....	.....	.....	.....	.....
Durant.....	.....	.....	.....	1	.....	.....	.....	.....
El Reno.....	4	.....	.....	.....	.....	.....	.....	.....
Lawton.....	2.2	.....	.....	.....	.....	.....	.....	.....
Muskogee.....	1.5	.....	.....	0.5	.....	0.5	.....	.....
Tulsa.....	6	.....	.....	2	.....	.....	3	.....
OREGON:								
Albany.....	.....	.....	.....	.....	.....	0.5	.....	.....
Baker.....	.....	.....	.....	.....	.....	0.7	.....	.....
Grant's Pass.....	.....	.....	.....	.....	.....	1.5	.....	.....
Oregon City.....	.....	.....	.....	.....	.....	.....	12	.....
The Dalles.....	.....	.....	.....	.....	.....	6	.....	.....
PENNSYLVANIA:								
Allentown.....	4	.....	.....	1	.....	.....	.....	.....
Bethlehem.....	.....	.....	.....	2	.....	.....	.....	.....
Carlisle.....	.....	.....	.....	.....	.....	.....	4.8	.....
Lebanon.....	.....	.....	.....	.....	.....	6	.....	.....
Easton.....	2	.....	.....	.....	.....	.....	.....	.....
Erie.....	.....	.....	.....	3	.....	.....	.....	.....
Gallitzin.....	.....	.....	.....	8	.....	.....	.....	.....
Grardville.....	.....	.....	.....	3.5	.....	.....	.....	.....
Harrisburg.....	.....	.....	.....	.....	.....	.....	.....	.....
Lansford.....	4	.....	.....	11.5	.....	.....	.....	.....
McKeesport.....	.....	.....	.....	10	.....	.....	.....	.....
McKees Rocks.....	.....	.....	20	.....	.....	.....	.....	.....

TABLE No. 3—MAXIMUM GRADES LAID IN 1910—Continued

City	Sheet Asphalt. %	Asphalt Block. %	Stone Block. %	Brick. %	Treated Wood Block. %	Bituminous Macadam. %	Plain Macadam. %	Gravel. %
PENNSYLVANIA—Cont.								
Meadville.....				4.2				
New Castle.....				6			3	
Norristown.....				12				
N. Braddock.....				12				
Oil City.....				3				
Pottstown.....				0.43				
Punxsutawney.....				5			10.8	
Reading.....			8	1.7		8.3		
St. Marys.....			11.2	6				
Scranton.....	8.7					5		
S. Bethlehem.....				3.2				
Tyrone.....			11.4	9.9				
Wilkes-Barre.....	4.2			3				
Williamsport.....								
RHODE ISLAND:								
Pawtucket.....			1	1		9	1.6	
Providence.....						7		
SOUTH DAKOTA:								
Lead.....						3		
TENNESSEE:								
Bristol.....					2		12	
Clarksville.....			10	3			10	
Knoxville.....	6							
TEXAS:								
Denison.....				2				
San Antonio.....				1		1.5		
Waco.....						1.5		
UTAH:								
Ogden.....	1							
Salt Lake.....	5.7							
VERMONT:								
Barre.....						2.5	4	
St. Albans.....							2	
VIRGINIA:								
Danville.....				3		3	5	
Hampton.....		3			0.4			
Norfolk.....	0.4							
WASHINGTON:								
Bellingham.....	9			8				
Seattle.....	7		19.5	13	0.6			
Spokane.....	4			14		4	9.5	
Tacoma.....	5		18	1				
WEST VIRGINIA:							8	
Martinsburg.....								
WISCONSIN:								
Appleton.....	6.1							
Chippewa Falls.....				1				
La Crosse.....				3.5				
Menomonie.....						8.2		
Watertown.....				1.5	0.2	1.8		
Waukesha.....						2.2		

TABLE No. 4—GUARANTEE PERIOD, YEARS

City	Sheet Asphalt.	Asphalt Block.	Stone Block.	Brick.	Wood Block.	Bituminous Macadam.	Plain Macadam.
CALIFORNIA:							
Fresno.....						None	
Oakland.....	None						
Pasadena.....	None						
San Jose.....	None						
Stockton.....	None						
COLORADO:							
Boulder.....			5			None	None
Denver.....							
CONNECTICUT:							
Ansonia.....			None	5			
Greenwich.....							
Hartford.....	5		5				
New London.....				5			
Norwalk.....			1				
Waterbury.....							
DISTRICT OF COLUMBIA:							
Washington.....	5						
FLORIDA:							
Sarasota.....			None				
GEORGIA:							
Americus.....					5	None	None
Cartersville.....							
Dublin.....				5			
Macon.....		5		5			
Savannah.....	5						
ILLINOIS:							
Batavia.....				5		1	
Bloomington.....				10			2
Chicago.....	5		5	5	5		
Decatur.....	5			1	None		
East St. Louis.....				5			
Elgin.....				5		3	5
Evanston.....				None			
Marion.....				None			
Mattoon.....				None			
Normal.....				1			
Oak Park.....	5			5			2
Paris.....				1			
Taylorville.....				None		2	
Waukegan.....				2			
INDIANA:							
Anderson.....				None			
Bedford.....				5			5
Bloomington.....				5			
Butler.....				5			
Columbus.....				5			
Evansville.....	5	5		5		5	
Fort Wayne.....				5			
Hammond.....				5			5
Kokomo.....	5			5			
Logansport.....	5			None			
Michigan City.....				None			
Mishawaka.....				None			
Muncie.....				None			
New Albany.....				10			
Peru.....				5			
Plymouth.....				5			
Portland.....						1	None
W. Lafayette.....							
IOWA:							
Ames.....				5	5		
Burlington.....				2			
Cedar Rapids.....				2			
Centerville.....				5			

TABLE NO. 4—GUARANTEE PERIOD, YEARS—(Continued)

City	Sheet Asphalt.	Asphalt Block.	Stone Block.	Brick.	Wood Block.	Bituminous Macadam.	Plain Macadam.
MISSISSIPPI:							
Vicksburg.....	5	.....	.....	5	.....	.....	.....
MISSOURI:							
Butler.....	.....	.....	.....	5	5	None	None
Cape Girardeau.....	.....	.....	.....	None	.....	None	None
Columbia.....	.....	.....	.....	.....	.....	None	None
Fulton.....	.....	.....	.....	.....	.....	.....	.....
Jefferson City.....	.....	.....	.....	5	.....	.....	.....
Liberty.....	.....	.....	.....	None	.....	.....	.....
Mexico.....	.....	.....	.....	None	.....	.....	.....
Noblerly.....	.....	.....	.....	5	7	5	2
St. Joseph.....	5	.....	7	5	5	5	None
St. Louis.....	5	.....	10	5	.....	.....	None
Sedalia.....	5	.....	.....	5	.....	None	.....
Webb City.....	.....	.....	.....	.....	.....	.....	.....
MONTANA:							
Billings.....	.....	.....	.....	5	5	.....	.....
Butte.....	.....	.....	None	None	.....	.....	.....
Helena.....	.....	.....	.....	None	.....	.....	.....
Missoula.....	.....	.....	.....	.....	None	.....	.....
NEBRASKA:							
Lincoln.....	5	.....	.....	1	.....	.....	.....
Norfolk.....	.....	.....	.....	1	5	.....	.....
So. Omaha.....	5	.....	.....	1	.....	5	.....
NEW HAMPSHIRE:							
Keene.....	.....	.....	.....	5	.....	.....	.....
Laconia.....	.....	.....	.....	.....	.....	5	.....
NEW JERSEY:							
Bayonne.....	5	.....	.....	1	.....	5	.....
Bloomfield.....	.....	.....	.....	.....	.....	.....	1
Camden.....	5	.....	1	.....	.....	.....	.....
Dover.....	.....	.....	.....	10	.....	1 to 5	.....
East Orange.....	3	5	.....	.....	.....	.....	.....
Elizabeth.....	.....	.....	1	5	.....	5	.....
Newark.....	5	.....	5	.....	5	.....	None
Paterson.....	.....	.....	.....	.....	.....	1	.....
Rutherford.....	.....	.....	.....	.....	.....	.....	.....
West New York.....	.....	.....	.....	1/2	.....	.....	.....
NEW YORK:							
Albany.....	5	.....	.....	.....	.....	.....	.....
Binghamton.....	.....	.....	.....	None	.....	.....	.....
Corning.....	.....	.....	.....	1	.....	1	.....
Herkimer.....	.....	.....	.....	None	.....	None	.....
Kingston.....	5	.....	1	.....	.....	.....	.....
New York, Bronx.....	5	.....	1	.....	.....	.....	.....
New York, Manhattan.....	5	.....	1	.....	.....	.....	.....
New York, Richmond.....	.....	5	.....	1	.....	.....	.....
Niagara Falls.....	.....	5	.....	.....	.....	.....	.....
Rochester.....	5	.....	.....	.....	.....	.....	.....
Salamanca.....	.....	.....	.....	.....	.....	.....	.....
Schenectady.....	5	.....	.....	.....	.....	.....	.....
Syracuse.....	10	.....	.....	.....	.....	.....	.....
Troy.....	5	.....	.....	.....	.....	.....	.....
Utica.....	5	.....	.....	.....	.....	.....	.....
Watertown.....	.....	.....	.....	.....	.....	.....	.....
Watervliet.....	.....	.....	.....	.....	.....	.....	.....
NORTH CAROLINA:							
Asheville.....	.....	.....	.....	.....	.....	5	.....
NORTH DAKOTA:							
Grand Forks.....	.....	.....	.....	.....	2	5	.....
OHIO:							
Ashabula.....	.....	.....	.....	5	.....	.....	.....
Bellevue.....	.....	.....	.....	5	.....	.....	.....
Bucyrus.....	.....	.....	.....	5	.....	.....	.....
Chillicothe.....	.....	.....	.....	1	.....	.....	.....

TABLE NO. 4—GUARANTEE PERIOD, YEARS—(Continued)

City	Sheet Asphalt.	Asphalt Block.	Stone Block.	Brick.	Wood Block.	Bituminous Macadam.	Plain Macadam.
IOWA—Continued							
Chariton.....	.....	.....	.....	1	1	.....	.....
Clinton.....	.....	.....	.....	1	.....	1	.....
Creston.....	.....	.....	.....	.....	.....	.....	.....
Dubuque.....	.....	.....	.....	1	.....	.....	.....
Grinnell.....	.....	.....	.....	.....	.....	.....	.....
Hampton.....	.....	.....	.....	5	.....	.....	.....
Iowa City.....	.....	.....	.....	1	.....	.....	.....
Muscatine.....	.....	.....	.....	None	.....	.....	.....
Ottumwa.....	.....	.....	.....	3	.....	.....	.....
Perry.....	.....	.....	.....	5	.....	.....	.....
Waterloo.....	5	.....	.....	.....	.....	.....	.....
KANSAS:							
Argentine.....	.....	.....	.....	1	.....	1	.....
Arkansas City.....	.....	.....	.....	5	.....	.....	.....
Atchison.....	.....	.....	.....	1	.....	.....	.....
Emporia.....	.....	.....	.....	.....	.....	.....	.....
Hutchinson.....	.....	.....	.....	1	.....	.....	.....
Independence.....	.....	.....	.....	None	.....	.....	.....
Leavenworth.....	.....	.....	.....	5	.....	.....	.....
Ottawa.....	.....	.....	.....	2	.....	.....	.....
Salina.....	.....	.....	.....	1	.....	.....	.....
Wichita.....	5	.....	.....	1	.....	.....	.....
Winfield.....	10 and 5	.....	.....	5	5	.....	.....
KENTUCKY:							
Louisville.....	5	.....	.....	.....	.....	.....	.....
Maysville.....	.....	.....	.....	3	.....	.....	.....
LOUISIANA:							
Alexandria.....	.....	.....	.....	5	.....	5	.....
Baton Rouge.....	.....	.....	.....	.....	5	.....	.....
New Orleans.....	5	.....	.....	.....	.....	.....	.....
MARYLAND:							
Baltimore.....	5	.....	5	5	.....	5	2
MASSACHUSETTS:							
Cambridge.....	.....	.....	.....	.....	.....	.....	.....
Lawrence.....	.....	.....	.....	.....	.....	.....	.....
New Bedford.....	.....	.....	.....	.....	.....	.....	.....
Newton.....	.....	.....	.....	.....	.....	.....	.....
Springfield.....	.....	.....	.....	.....	.....	.....	.....
Waltham.....	.....	5	.....	.....	5	.....	.....
Westfield.....	.....	.....	.....	.....	.....	.....	None
Worcester.....	5	.....	.....	.....	.....	.....	.....
MICHIGAN:							
Albion.....	.....	.....	.....	.....	.....	.....	.....
Crystal Falls.....	.....	.....	.....	.....	.....	.....	.....
Detroit.....	.....	.....	.....	.....	.....	.....	.....
Dowagiac.....	.....	.....	.....	.....	.....	.....	.....
Flint.....	5	.....	.....	.....	.....	.....	.....
Holland.....	.....	.....	.....	.....	.....	.....	.....
Grand Rapids.....	.....	.....	.....	.....	.....	.....	.....
Ionia.....	.....	.....	.....	.....	.....	.....	.....
Lansing.....	.....	.....	.....	.....	.....	.....	.....
Monroe.....	.....	.....	.....	.....	.....	.....	.....
Muskegon.....	.....	.....	.....	.....	.....	.....	.....
Negaunee.....	.....	.....	.....	.....	.....	.....	.....
Petoskey.....	.....	.....	.....	.....	.....	.....	.....
Pontiac.....	.....	.....	.....	.....	.....	.....	.....
Port Huron.....	.....	.....	.....	.....	.....	.....	.....
Saginaw.....	5	.....	.....	.....	.....	.....	.....
St. Joseph.....	.....	.....	.....	.....	.....	.....	.....
MINNESOTA:							
Albert Lea.....	.....	.....	.....	.....	.....	.....	.....
Crookston.....	.....	.....	.....	5	5	.....	.....
Minneapolis.....	.....	.....	.....	.....	.....	.....	.....
Red Wing.....	.....	.....	.....	.....	.....	.....	.....
St. Paul.....	5	.....	.....	.....	.....	.....	.....

TABLE No. 4—GUARANTEE PERIOD, YEARS—Continued

City	Sheet Asphalt.	Asphalt Block.	Stone Block.	Brick.	Wood Block.	Bituminous Macadam.	Plain Macadam.
UTAH:							
Ogden.....	7	.....	.....	.....	.....	.....	.....
Salt Lake.....	5	.....	.....	.....	.....	.....	.....
VERMONT:						5	.....
St. Albans.....	.....	.....	.....	.....	.....	.....	.....
VIRGINIA:						5	.....
Danville.....	.....	None	None	None	.....	.....	None
Hampton.....	5	5	.....	.....	5	.....	.....
Norfolk.....	.....	.....	.....	.....	.....	.....	.....
WASHINGTON:							
Bellingham.....	10	.....	.....	10	.....	.....	.....
North Yakima.....	5	.....	.....	.....	.....	.....	.....
Seattle.....	5 and 10	.....	.....	5	.....	.....	.....
Spokane.....	5	.....	.....	.....	.....	.....	.....
WISCONSIN:							
Appleton.....	5	.....	.....	.....	.....	.....	.....
Beloit.....	.....	.....	.....	None	None	.....	.....
Chippewa Falls.....	.....	.....	.....	None	.....	.....	.....
Kenosha.....	.....	.....	.....	5	.....	.....	.....
Racine.....	5	.....	.....	.....	.....	.....	.....
Watertown.....	.....	.....	.....	None	.....	.....	.....
Waukesha.....	.....	.....	.....	5	.....	2	.....

had been reached by past experience as to grades permissible or unobjectionable. The steepest grades reported were paved with stone block, these being 20 per cent at McKees Rocks, Pa.; 19.5 per cent at Seattle, and 18 per cent at Tacoma and Ashtabula, O.

The next steepest grades were found on macadamized streets, there being a 17 per cent grade at Springfield, O., 16 at Troy, N. Y.; 14 at Everett, Mass., and 13 at De Soto, Mo. Brick is found on streets almost as steep, however, there being a 16.5 per cent grade at Ottumwa, Ia., 14 per cent at Spokane, 13 per cent at Seattle and Atchison, Kan.; 12 per cent at N. Braddock and Oil City, Pa., and 11.5 at McKeesport, Pa. Bituminous macadam also was laid on one street with a 15 per cent grade at Cape Girardeau, Mo.; 13 per cent at Phillipsburg, N. J., and 12 at Asheville, N. C.

There is very little difference between the maximum grades used for wood block and sheet asphalt, respectively, the maximum grades given the latter being 8.7 at Scranton, Pa.; 8.5 at Vicksburg, 7 at Seattle, 6.8 at East Orange, N. J., and 6 per cent in Oakland, Cal.; Washington, D. C.; Louisville, Knoxville and Appleton, Wis.; while wood block was laid on an 8 per cent grade in South Omaha and 7 per cent in Albert Lea, Minn. Aside from those two, however, wood block was not laid on grades greater than 3 or 4 per cent, 4 per cent grades being found at Americus, Ga.; Ottumwa, Ia.; Minneapolis, Cincinnati, and Watertown, N. Y.; while 3 per cent grades were found at Ames and Perry, Ia.; Cape Girardeau, Mo.; Patterson, N. J., and St. Louis. The flattest maximum grades are found on the asphalt block streets, the maximum being 6 per cent in Bronx Borough, New York City, and in Springfield, Mass.; 5.1 per cent at Springfield, O., and 4 per cent at East Orange, N. J.

LENGTH OF GUARANTEES

The data concerning guarantees indicates that the move toward the abolishing of guarantees for pavements has already

TABLE No. 4—GUARANTEE PERIOD, YEARS—Continued

City	Sheet Asphalt.	Asphalt Block.	Stone Block.	Brick.	Wood Block.	Bituminous Macadam.	Plain Macadam.
OHIO—Continued							
Cincinnati.....	5	.....	5	2	5	5	.....
Cleveland.....	10	.....	5	3	.....	.....	None
Columbus.....	5	.....	.....	3	.....	.....	.....
Coshocton.....	.....	.....	.....	5	.....	.....	.....
Delaware.....	.....	.....	.....	5	.....	.....	.....
E. Palestine.....	.....	.....	.....	1	.....	.....	.....
Hamilton.....	.....	.....	.....	5	.....	.....	.....
Leetonia.....	.....	.....	.....	1	.....	.....	.....
Lima.....	.....	.....	.....	5	.....	.....	.....
Lockland.....	.....	.....	.....	5	.....	.....	.....
Lorain.....	.....	.....	.....	5	.....	.....	.....
Marietta.....	.....	.....	.....	5	.....	.....	.....
Newark.....	.....	.....	.....	1	.....	.....	.....
Oberlin.....	.....	.....	.....	2	.....	.....	.....
Ortsmouth.....	.....	.....	.....	2	.....	.....	.....
Sandusky.....	5	5	5	3	5	.....	.....
Springfield.....	5	.....	.....	5	.....	.....	.....
Van Wert.....	.....	.....	.....	5	.....	.....	.....
Zanesville.....	.....	.....	.....	2	.....	.....	2
OKLAHOMA:							
Bartlesville.....	.....	.....	.....	.....	.....	.....	.....
Chickasha.....	5	.....	.....	5	.....	5	.....
Durant.....	.....	.....	.....	5	.....	.....	.....
El Reno.....	10	.....	.....	.....	.....	.....	.....
Lawton.....	5	.....	.....	5	.....	.....	.....
Muskogee.....	5	.....	.....	5	.....	5	.....
Tulsa.....	5 and 10	.....	.....	.....	.....	.....	5
OREGON:							
Albany.....	.....	.....	.....	.....	.....	10	.....
Baker.....	.....	.....	.....	.....	.....	5	.....
Grant's Pass.....	.....	.....	.....	.....	.....	.....	.....
PENNSYLVANIA:							
Allentown.....	1	.....	.....	1	.....	.....	.....
Bethlehem.....	.....	.....	.....	.....	.....	.....	8
Erie.....	5	.....	.....	5	.....	.....	.....
Galtzheim.....	.....	.....	.....	5	.....	.....	.....
Girardville.....	5	.....	.....	.....	.....	.....	.....
Harrisburg.....	.....	.....	.....	.....	.....	.....	.....
Lansford.....	.....	.....	.....	.....	.....	.....	.....
McKees Rocks.....	.....	.....	1	.....	.....	.....	.....
Meadville.....	.....	.....	.....	.....	.....	.....	.....
New Castle.....	.....	.....	.....	.....	.....	.....	.....
N. Braddock.....	.....	.....	.....	.....	.....	.....	.....
N. East.....	.....	.....	.....	.....	.....	.....	.....
Oil City.....	.....	.....	.....	.....	.....	.....	.....
Philadelphia.....	5	.....	.....	None	10	.....	.....
Punxsutawney.....	.....	.....	.....	.....	.....	.....	.....
Reading.....	5	.....	.....	.....	.....	.....	.....
Scranton.....	.....	.....	.....	.....	.....	.....	.....
Sharon.....	5	.....	.....	.....	.....	.....	.....
St. Bethlehem.....	.....	.....	.....	.....	.....	.....	.....
T. none.....	.....	.....	.....	.....	.....	.....	.....
Williamsport.....	.....	.....	.....	.....	.....	.....	.....
SOUTH CAROLINA:							
Columbia.....	.....	.....	.....	.....	.....	.....	.....
Greenwood.....	.....	.....	.....	.....	.....	5	.....
SOUTH DAKOTA:							
Aberdeen.....	.....	.....	.....	.....	None	.....	.....
TENNESSEE:							
Clarksville.....	.....	.....	.....	.....	.....	.....	.....
Knoxville.....	5	.....	5	.....	.....	.....	None
TEXAS:							
Austin.....	.....	.....	.....	.....	.....	.....	.....
Waco.....	.....	.....	.....	5	.....	5	.....

produced results in a considerable number of cities. Twenty-one states contain some cities which called for no guarantee at all on the pavements laid last year, and in California, Florida and South Dakota this was true of all the cities reporting. In certain other cities guarantees were not demanded on certain classes of pavements but were on others. In one case the abolishing of guarantees applied to stone block only, in two cases to brick only, in one case to wood block only and in six cases to macadam only. Altogether 72 cities reported requiring no guarantee, four of these, or 6 per cent, being for sheet asphalt; one, or 7 per cent, for asphalt block; 7, or 19 per cent, for stone block; 27, or 17 per cent, for brick; 6, or 18 per cent, for wood block; 14, or 20 per cent, for bituminous macadam, and 13, or 43 per cent, for plain macadam.

Five-year guarantees are still required in the great majority of cities, there being 242 of these, as against 72 requiring no guarantee, 49 requiring one year, 17 requiring two years, 16 requiring ten years, 14 requiring three years, 3 requiring seven years and one requiring eight years. It is perhaps significant that plain and bituminous macadam lead in the percentage of pavements for which no guarantee is asked, while sheet asphalt and brick lead in those for which ten year guarantees are asked. There does not seem to be any geographical distribution of the several periods of guarantee, each being pretty generally distributed all over the country. For instance, all the California cities reported asking no guarantee, while two Washington cities report ten year guarantees and three report five year guarantees. One New Jersey city reports a six months' guarantee.

TRAFFIC CARRIED

Information was also collected concerning the traffic on the streets in question, those replying being requested to state whether this was "heavy" or "light." These terms, of course, are not subject to definition or limitation, since our knowledge concerning street traffic is as yet in its infancy. It was therefore necessary to leave the decision as to what was light and what was heavy traffic to the individuals themselves. While there would undoubtedly be great differences of opinion on this point, depending upon the experience which each had had with the heavy traffic of large cities, it is believed that these would to a certain extent average up, although it is probable that the kinds of pavement which are found in greatest abundance in the smaller cities would be given credit for a heavier traffic than those more common in the larger cities. For instance, an engineer in Chicago or Minneapolis might report the traffic on a certain stone block pavement as being moderately light, which traffic, if it occurred in a small city, would be reported as very heavy. One engineer only gives any definite figures as to traffic, City Engineer Christopher Harrison of Everett, Mass., reporting the traffic on a stone block pavement as amounting to 40 tons per lineal foot per hour. Possibly a few others might have been able to give figures, but such figures are so few in this country that it seemed not worth while to ask for them from cities generally.

Taking up the data classified under the heads of the several pavements, we find that traffic on the sheet asphalt pavements was reported to be heavy in 19 per cent of the cities, medium in 34 per cent, and light in 47 per cent. Traffic on asphalt block was reported to be heavy in no case, to be medium in 47 per cent and light in 53 per cent. Of the stone block pavements 65 per cent were reported to carry heavy traffic, 21 per cent medium traffic, and 14 per cent light traffic. Of the brick pavements 31 per cent were reported to carry heavy traffic, 33 per cent medium traffic and 36 per cent light traffic. Of the wood block pavements 51 per cent were reported to carry heavy traffic, 25 per cent medium traffic and 24 per cent light traffic. Of the bituminous macadam pavements 25 per cent were reported to carry heavy traffic, 28 per cent medium traffic and 47 per cent light traffic. Of the plain macadam roads 18 per cent were reported to carry heavy traffic, 18 per

cent medium traffic and 64 per cent light traffic. Of the gravel roads 21 per cent were reported to carry heavy traffic, 17 per cent medium traffic, and 62 per cent light traffic. An inspection of these figures shows that stone block and wood block pavements seem to be considered especially adapted to heavy traffic, the macadams to light traffic, sheet asphalt and asphalt block to light and medium traffic; while brick seems to be considered equally well adapted to all classes.

Arranging the several pavements in the order in which they are chosen for heavy traffic we find them classified as follows: Stone block, wood block, brick, bituminous macadam, gravel, sheet asphalt, plain macadam, asphalt block. If, on the other hand, we arrange them according to their preference for light travel, giving such preference in the inverse order so as to make it more comparable with the other list, we have the following order: Stone block, wood block, brick, bituminous macadam, sheet asphalt, asphalt block, gravel, plain macadam. It is seen that so far as permanent pavements are concerned the two lists give exactly the same order to the several pavements.

While there is nothing novel or startling in the conclusions just stated, it serves to confirm the general impression that not only stone block but also wood block are especially adapted to heavy traffic, and that brick, while not generally chosen for the heaviest traffic, is quite popular as a general all-around pavement; this being especially true in the Mississippi Valley. The table from which these conclusions were drawn we are expecting to publish in next week's issue.

WOOD BLOCK PAVING IN PENSACOLA

Streets with Flat Grades on Low Ground—Cement Mortar Cushion—Expansion Joints Between Tracks—Settled with Light Roller

By GEORGE ROMMEL, JR., Pensacola, Fla.

Pensacola, Fla., is a city of approximately 30,000 people situated on the Gulf of Mexico. Prior to 1909 the only permanent pavement in the city was a small stretch of brick approximately one-half mile in length which was laid in 1896. All of the other streets were of sand, with a few exceptions which had been hardened with clay. Under a bond issue the city advertised for bids on various kinds of pavements, the total work to be done being approximately 175,000 square yards. Contracts were awarded to the United States Wood Preserving Company of New York for wood block and to the Southern Paving and Construction Company of Chattanooga, Tenn., for brick, each company securing about half the work. The work has now been completed and Pensacola has about 11.5 miles of permanent pavement. Contracts will soon be let for an additional 10 miles so that the major portion of the city will be well provided for.



PENSACOLA STREET CONTAINING CAR TRACKS

Prior to the letting of the contracts, a great deal of opposition to wood block arose, owing to the experiences of our neighboring cities. The climate here is quite damp, as the prevailing winds are from the Gulf, and it was thought that the conditions were such that a wood block pavement could never be a success. Again, the lower part of the city is quite flat and low—the mean elevation 3500 feet from the harbor being only 9.4 above the mean low water. This section was originally a swamp and as the drainage facilities were not of the best the argument was advanced that this wet sub-soil would be very injurious to a wood block pavement. However, considerable of this opposition was overcome and practically all of the pavements laid in this district were of wood block. No trouble has been experienced from swelling or expansion, although the pavement has been down for about a year. The surface is as good, if not better, than when it was laid, and I see no reason to believe that we will ever have any trouble whatsoever. The traffic conditions are favorable, as 80 per cent of the streets are 25 feet wide, except that where there are car tracks the width is 30 feet. There have been no definite traffic records kept, but the hauling is of the mean business class, no great amount of heavy hauling being done here. Of course, with these widths, the pavement gets a uniform service which tends to keep the surface in good condition.

The blocks are of first growth long leaf yellow pine, $3\frac{1}{2}$ inches deep, by 6 to 8 inches long by 3 to 4 inches wide. The original specifications called for 90 per cent heart, but it was found that it was almost impossible to secure this grade of timber, so the requirements were changed to 75 per cent heart, which gave very satisfactory results. The blocks were subjected to a treatment of heavy creosote oil in the amount of 20 pounds per cubic foot of wood and no charge was accepted which absorbed more than 3 per cent of water after 24 hours drying and 24 hours immersion. A very rigid inspection was maintained at the plant and also on the work and an excellent quality of block was obtained. The blocks were made and treated by the Southern Creosoting Company of Slidell, Miss.

The blocks were laid on concrete foundation 4 inches in thickness, the concrete being in the proportion of 1:3:6. A very good grade of gravel was used in the concrete, gravel being much cheaper than crushed stone in this locality. The cushion coat consisted of a mixture of one part of Portland cement to three of sand, mixed dry and spread on the concrete to a depth of $\frac{1}{2}$ inch or greater. This cushion coat was formed by a template so that its surface was parallel with the finished surface of the pavement. The mortar was dampened with sprinkling cans immediately in advance of the block laying, care being taken not to have it too wet. After the block had been laid and before any initial set had taken place in the mortar bed, the surface was rolled with a light roller until all irregularities had been rolled out. Tamping was tried at first, but much more satisfactory results were obtained by rolling. A sand cushion was also tried but was soon abandoned as the mortar cushion gave much better results.

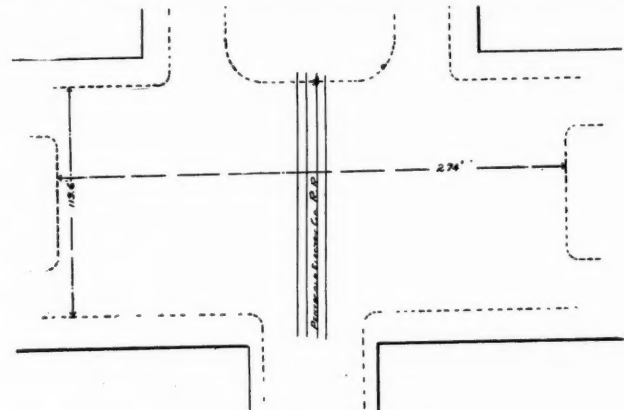


INTERSECTION WITHOUT EXPANSION JOINTS

The blocks were laid at right angles to the curb, with two longitudinal courses next to each curb. Expansion was taken care of by three expansion joints along each curb and transversely by one joint every 50 feet. The greatest trouble was experienced around these transverse joints. The expansion between the rails was provided for by staggering block-end expansion joints diagonally from one rail to the other and back to the first, with about 10 feet between apexes.

This method was tried as an experiment and gave such satisfactory results that we have adopted it in all our work.

One rather remarkable piece of work is an intersection shown in photograph and illustrated by accompanying sketch. This intersection contains about 2700 square yards and the grades at this point are very flat. The intersection was laid



SKETCH OF INTERSECTION

in small sections due to the fact that the blocks did not arrive fast enough to complete the whole section in one operation. The only expansion provided in the entire intersection is that along the rails and along the curbs. The surface to-day is perfect and no water stands anywhere in the whole section.

In conclusion, I wish to state that wood block pavement in Pensacola has been an unqualified success and many of those who were originally doubtful of this pavement are now its strongest advocates. I have no hesitation whatever in stating that the wood block pavement in climates such as Pensacola will be perfectly satisfactory, if care is taken in the selection of timber, proper treatment, and rigid inspection both at the plant and on the work.

UNTREATED WOOD BLOCKS

While most cities have abandoned the laying of the old round cedar blocks, there are still a few being laid in the country. Detroit, Mich., in 1910 laid 144,586 square yards of such pavement as new paving and 5,798 as resurfacing. This was laid on 6 inches of concrete, covered with a $1\frac{1}{2}$ -in sand cushion, and consisted of cedar blocks 4 inches long, of the best quality of sound, selected, live timber, stripped of all bark, between $4\frac{1}{2}$ and 9 inches in diameter. The spaces between these was filled with broken stone or gravel, which was thoroughly tamped into place. The pavement was then rolled and the spaces between the stones filled with pitch. One-half-inch of fine, sharp gravel was then spread over the surface.

IRON-CONCRETE PAVING BLOCKS

A novel French pavement consists of blocks made by filling moulds with matted iron shavings, or iron excelsior, and then pouring in cement sufficiently fluid to penetrate the entire mass. The blocks have great strength, resistance to abrasion and elasticity under blows or jarring. Tests have shown a resistance of 150,000 pounds per square inch, and a strength four times as great as that of ordinary cement. It is claimed that joints may almost be eliminated in this paving—an important advantage, as this takes away the parts of greatest wear and destruction.

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MARCH 15, 1911.

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Best Pavements in Demand

Street paving interests are given exclusive attention in the general reading pages of this issue, and among the articles will be found specifications for modern stone block pavements and for the latest improved brick rattler, and a glossary of practically all terms in common use relating to bituminous materials used in road construction and treatment. The statistics of pavements constructed and to be constructed this year give a very accurate birdseye view of the paving work of all kinds which is being done throughout the country. The greatest amount of space, however, it will be noticed, is given to descriptions of wood block pavements and specifications for them. This is not because they are the most important or most generally used pavement, but because this class of pavement seems to be coming into general use in the larger and some of the smaller cities, and because there are certain questions concern-

ing both the material to be used and the method of using it which are open to and are receiving more discussion possibly than any other kind of pavement at the present time. This again is an indication of the fact that cities are reaching the point where they are willing to spend more money on their pavements; wood block pavement being among the most expensive of any in common use. Another indication of the same thing is found in New York City, where it is said that the Borough President of Manhattan proposes substituting for asphalt, which costs \$3.34 a square yard, smoothly dressed stone block pavements at a cost of 20 cents per square yard greater.

Cost of Pavements

THE latest report of the Census Bureau dealing with the expenditures of American cities is that for the year 1908, and a few figures from this may be of interest as showing the amount of money spent by American cities for street construction during that year. These figures include only cities of more than 30,000 population, but it is probable that the total expenditures of cities smaller than those would add only a small per cent—probably not more than ten—to these totals.

The total expenditures for highway construction by cities of more than 30,000 population was \$87,442,195, which was an average amount of \$3.63 per capita. In the sixteen cities having more than 300,000 population the per capita outlay was \$3.78; in the thirty cities having between 100,000 and 300,000 population the outlay per capita was \$4.14; in the forty-seven cities having between 50,000 and 100,000 population the per capita outlay was \$2.80, and in the sixty-five cities having between 30,000 and 50,000 population the per capita outlay was \$3.03.

The variation between the average per capita outlays in these four groups is about 50 per cent between the second and third groups, which show the extremes, but when we examine the figures for the individual cities we find much greater variations. Among the cities of the first group the maximum per capita outlay was that of Washington, D. C., \$7.94. Pittsburgh was second with a rate of \$5.83, with Cincinnati a close third with \$5.62. Chicago's expenditures were only \$2.02 per capita, while New Orleans had a minimum rate of \$1.06.

In the second group the variations were still greater, Portland, Ore., having a maximum rate of \$16.29 and Providence, R. I., a minimum of \$0.54. It is possible that Seattle, Wash., should have been given a rate higher than that of Portland, the total expenditures for the year having been \$3,199,270, but no per capita rate was determined by the Census Bureau "because no reliable estimate of population could be made." It is probable that these and some of the other high rates were due largely to expensive grading and opening up of new streets fully as much as to the construction of pavements.

In the third group Salt Lake City leads with a rate of \$7.23 per capita, and the minimum rate in this group is that of Hoboken, N. J., 25 cents per capita.

In the fourth group we find the greatest variation of all, the maximum rate being that of Oklahoma City, Okla., \$19.18, and the minimum being 8 cents, which is attributed to Macon, Ga., the total expenditure for the year in that city being only \$2,507. Here again it is probable that the high rate in Oklahoma City was due to the rapid growth and enormous amount of new streets opened up and graded.

While these figures do not distinguish between money spent in opening up streets and that spent in paving them, it is probable that in the largest cities, at least, much the greater part of the expenditure was for paving and pavement repairing, and it is probably a conservative estimate that \$75,000,000 was spent on paving streets of cities of more than 30,000 population in 1908. If we allow for the amount spent by the smaller cities and also for the increased amount of the more permanent and expensive pavements being put down each year, it probably would not be far out of the way to estimate that about \$100,000,000 will be spent this year for paving purposes in the United States.

The total amount of outlays by the cities included in the Census Report of 1908 was \$275,000,000, or a little more than three times the amount spent on highways. It is probable, therefore, that the expenditures for pavements constitute approximately 25 per cent of the total outlays of all such cities. The Census Bureau defines outlays as being "the accrued costs, paid or payable, of lands and other properties more or less permanent in character, and thus available for more than a single use, which are owned or used by municipalities in the exercise of their governmental functions or in connection with the business undertakings conducted by them." They, therefore, do not include such items as street cleaning, the maintenance of schools, etc., although they would include school buildings. For comparison it may be noticed that the only other class of outlays which at all approached those for highways is the amount spent for public service enterprises such as water works, street lighting, etc., which amounted to \$80,260,139; school buildings and other educational investments coming third with a little over \$40,000,000.

PAVEMENTS IN GRAND FORKS

First Pavements of Untreated Round Cedar Blocks—Modern Wood Block, Blome and Bitulithic Now Used—Methods of Construction

By H. G. LYKKEN, City Engineer

The first pavement laid in Grand Forks, N. D., was 12.6 miles of cedar blocks put down in 1898 to 1900. This pavement consisted of a 3-inch sand base on top of the heavy clay which constitutes the soil of the city, next a 2-inch pine plank on top of which the cedar blocks were placed. These blocks were cut 6 inches long (or high, as laid in the pavement), of material varying from 5 to 10 inches in diameter. The round blocks were placed as close together as possible, with the fibers vertical and with the spaces between filled with sand and gravel.

This pavement did good service for about six years before any repairs became necessary. Where the traffic was heaviest the blocks wore round at the edges, giving a cobble-stone effect to the street. After about eight years repairs were no longer possible in the business portion of the city. Decay as much as anything else brought about a total failure at about this period in the life of the pavement. The rate of deterioration seemed to be about the same for both the block covering and the plank foundation. The pavement did not fail on account of the rotting out of the plank, yet, on the other hand, the planks were fit only for firewood when removed.

As a general conclusion, the untreated cedar block gives a rough pavement even with moderate traffic after five years' service. I have seen them tried on concrete foundation with no better result than on the untreated plank foundation used in Grand Forks. After about eight years the pavement breaks down completely and is almost impassable after ten years, even in the light traffic of a residence district.

In 1908 the city instituted a policy of putting all pavements on a 6-inch concrete foundation mixed one part of cement to from eight to nine parts of gravel aggregate. The first year 44,000 yards of creosoted blocks were laid to which 50,000 yards have been added since. In addition, the city has constructed in the past three years 20,756 yards of R. S. Blome concrete pavement, and 75,837 yards of bitulithic and similar pavements.

The creosoted block used is 3½ inches deep and treated with 20 pounds of oil to the cubic foot of wood. Both Norway pine and tamarack wood have been used, with no perceptible difference noticed. The blocks are laid on a sand cushion about 1 inch thick. A filler of coke oven pitch tempered with a lighter tar has been used altogether. After the blocks are laid and rolled and the filler poured while as hot as possible a layer of sand is spread over the surface. This sand is kept on for several weeks, being sprinkled with water from time to time to keep it from blowing off. This seems to have eliminated all trouble from bleeding of the blocks and from the tar filler.

The first pavement laid gave much complaint from the tracking of tar onto the sidewalks and into the houses, as the precaution of keeping the sand on was not observed. Later experience leaves no doubt, however, that the sand overcomes this difficulty.

The streets are perfectly smooth with no signs of wear or deterioration perceptible even with heavy wholesale traffic of farm traction engines and threshing machinery. Extremes of temperature as we have it here do not seem to affect the blocks, nor has there been any tendency for the pavement to swell or heave, even where the full paved width is 50 feet. No estimate of the life of the pavements can be given at this time but it is my opinion that they will give a serviceable street for 20 years, with a minimum of repair.

The only objections to the pavement is its hardness and slipperiness. The blocks are as hard and smooth as concrete. When the pavement is wet, and especially when frosted, a horse cannot stand up unless very well shod. But in spite of the hardness the blocks are not as noisy as brick blocks, the sound being deader.

The special feature of the Blome or concrete pavement is the use of hard granite or trap rock screenings for the wearing surface, which is mixed one part of cement to one and one-half parts of screenings which range from ½-inch down to ⅛-inch mesh. The pavement is blocked off into rectangles 4½ inches by 9 inches to give proper foothold to traffic. This pavement gives eminent satisfaction on account of its pleasing appearance, ease of cleaning and sanitary condition at all times. It is not affected by the climatic conditions, nor is it noisy as would be supposed. Our experience with it is in a quiet residence district where there is no through traffic or fast driving with horses. My opinion is that it is an ideal pavement for such conditions. I would not recommend it for business streets or streets of considerable through traffic and subject to rather fast driving with horses. It is not slippery but its hardness must be objectionable for horses.

Nothing need be said with respect to the other pavement, as its wide distribution and similarity to asphalt, as far as appearance and general qualities are concerned, make it familiar to all. A tar or asphalt concrete, as a general term applicable to all such pavements, when correctly constructed, makes a pavement suitable for almost all kinds of traffic. Its resilience commends it to horse-drawn traffic. Climatic conditions seem to have no deleterious effect on asphalt, bitulithic or similar pavements where the local condition of extreme cold is taken into consideration in tempering the binder.

BRIDGE FLOORING

After some 25 years of experience with replanking its bridges and the never-ending expense and generally poor condition of the covering, the city a year ago paved the largest one with creosoted blocks. The joist and 3-inch plank covering, which were put in new, were boiled for about three minutes in coal tar, the crude product direct from the gas retorts being used. The blocks were tamarack 3½ inches deep, treated with 20 pounds of oil to the cubic foot.

The special feature of the pavement was the use of a sand and asphalt mortar for the joints. This mortar, a mixture of sand and an asphalt tempered in such a way as to retain its adhesiveness and ductility in the wide range of temperature we have here, was mixed on a hot plate and used hot. The blocks were put in place with a push joint of the mixture to insure not only a full joint of the mortar, but a cementing of the blocks to the planking below. The blocks were put on the planking without a cushion except a possible film of the mortar.

This construction has entirely overcome the frequent trouble with blocks coming loose on bridges. Subsequent attempts to remove blocks have proven the impossibility of their coming loose. The blocks will break rather than come loose from the mortar.

A slight crown was given the pavement by springing the plank covering over the joist. The results have been eminently satisfactory and a great saving is expected over continual replanking.

WOOD PAVING IN AMERICAN CITIES

One Hundred Cities Have Laid It—Pavements in Boston, Chicago and Philadelphia—Description of the Original Creo-Resinate Process—Chicago Specifications for Treating Blocks—Some Early Creosoted Wood Pavements

The general history and specifications of wood paving in New York City form the theme of the leading article in this issue. The other large cities of the country, however, have all used more or less modern wood block pavement. Boston, Mass., is generally cited as the first city in the East in which modern wood block pavement was laid (see, however, statements further on in this article), and more or less of this is laid every year. During 1910 something over 3,000 square yards were laid. The first pavement in Boston was laid in 1900 on Tremont street in front of the upper end of the Common. At the convention of the American Society of Municipal Improvements in 1901 Mr. B. T. Wheeler, superintendent of streets of Boston, stated that the amount laid that year was 1,360 square yards. He further described the blocks as being uniformly 4 inches wide, 4 inches deep and 8 inches long, of long leaf Georgia yellow pine. The blocks had been placed in an air-tight cylinder and subjected to a dry heat of 215 degrees F. for one hour, after which the heat was increased and pressure applied, both being raised gradually during two hours until 285 degrees and 90 pounds pressure were reached, to which the blocks were subjected for another hour. During the next hour the heat was reduced to 250 degrees and the pressure to about 40 pounds, following which a vacuum of 26 inches was created, and while under this vacuum a mixture of one-half creosote and one-half resin was run into the cylinders, after which pressure was applied which gradually reached 200 pounds per square inch, at which it was maintained until from 21 to 22 pounds of the mixture per cubic foot had been absorbed by the wood. The wood was then placed in another cylinder and subjected for one hour to milk of lime applied under a pressure of 200 pounds at 150 degrees temperature. These blocks were laid on a one-inch sand cushion and the joints filled with dry screened sand, the pavement then rolled with a five-ton steam roller and the joints finally filled with a creo-resinate pitch heated to 300 degrees and covered with $\frac{1}{4}$ inch of clean, sharp sand. In the following year at the convention of the same society Mr. McClintock, a consulting engineer of Boston, stated that he had never noticed any slipping of horses on this street; and a representative of this Journal was recently informed by the policeman on the beat that there was no trouble of this kind on this stretch of wood block.

Probably the largest amount of wood block paving found in any one city is approximately 800,000 yards in Minneapolis, Minn. The next largest is apparently New York City with nearly 700,000 square yards. Indianapolis is said to have about 500,000 square yards; Cincinnati, 300,000, and Chicago about the same. Besides these, Mobile, Ala.; Pensacola, Fla.; Toledo, O., and probably some other cities have each more than 100,000 square yards of modern wood block pavement.

CHICAGO

One of the most comprehensive plans for wood block paving is that of the city of Chicago, which proposes to lay this kind of pavement upon practically all of the streets of what is known as the "loop district"—the business district of the city. During 1910 five contracts for wood block paving were carried out, one for 5,700 square yards at \$3.16; another for 10,600 square yards, at \$3.35; a third for 5,200 square yards, at \$3.35; a fourth for 6,300 square yards, at \$3.42, and a fifth for 5,300 yards, at \$3.45. In constructing these pavements the subgrade was rolled with a ten-ton three-wheeled roller. Following this there was laid an 8-inch Portland cement concrete foundation, mixed 1:3:6; and this was covered with a sand cushion to receive the blocks. This sand cushion was intended to be one-inch thick; but, owing to the fact that in spite of all

precautions the surface of the concrete had not been brought parallel to the finished surface, the sand cushion varied in thickness from $\frac{1}{2}$ inch to several inches, it being necessary in some cases to chip off the concrete in order to secure the $\frac{1}{2}$ inch of sand. Where more than one inch was used it was found that the blocks did not hold their surface well. The blocks were of long leaf yellow pine, $3\frac{3}{4}$ inches wide, 4 inches deep and from 5 to 10 inches long. These were treated with creosote oil, the specifications for which were as follows:



MADISON STREET, CHICAGO. WOOD BLOCK PAVING

The oil shall be a pure coal-tar product, free from any adulteration. It must not contain any petroleum oil or any product obtained from petroleum and shall contain not more than 5% of matter insoluble in benzole and chloroform. No oil obtained wholly or in part from water-gas tar or oil tar will be accepted.

The specific gravity of the oil shall be at least 1.10 at 25° C.

The oil shall be subject to a distilling test as follows:

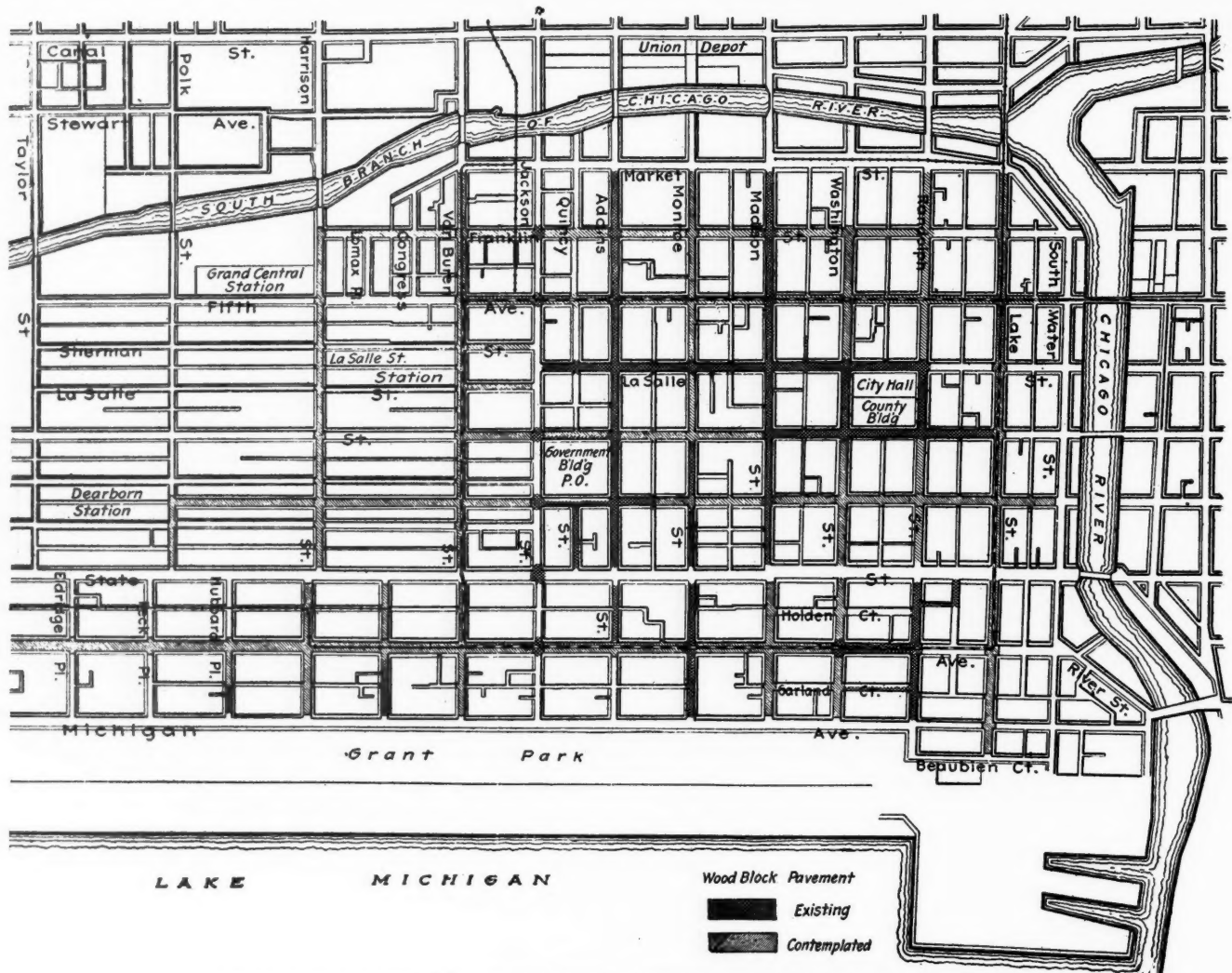
The apparatus for distilling the creosote must consist of a stoppered glass retort having a capacity, as nearly as can be obtained, of 8 oz. to the bend of the neck, when the bottom of the retort and the mouth of the off-take are in the same plane. The bulb of the thermometer shall be placed $\frac{1}{2}$ in. above the liquid in the retort at the beginning of the distillation, and this position must be maintained throughout the operation. The condensing tube shall be attached to the retort by a tight cork joint. The distance between the thermometer and the end of the condensing tube shall be 22 inches and during the process of the distillation the tube may be heated to prevent the congealing of the distillates. The bulb of the retort and at least 2 inches of the neck must be covered with a shield of heavy asbestos paper during the entire process of distillation, so as to prevent heat radiation, and between the bottom of the retort and the flame of the lamp or burner two sheets of wire gauze each 20 mesh fine and at least 6 inches square must be placed. The flame must be protected against air currents.

The distillation shall be continuous and uniform, the heat being applied gradually. It shall be at a rate approximating one drop per second, and shall take from 30 to 40 minutes after the first drop of distillate passes into the receiving vessel. The distillates shall be collected in weighed bottles and all percentages determined by weight in comparison with dry oil. When 100 grams of the oil are placed in the retort and subjected to the above test, the amount of distillate shall not exceed the following:

Up to 150° Centigrade.....	2%
Up to 210° Centigrade.....	10%
Up to 235° Centigrade.....	20%
Up to 315° Centigrade.....	40%

The contractor shall deliver to the Board of Local Improvements an affidavit setting forth that all oils used for treating the blocks for this contract are oils obtained wholly and entirely from coal tar and free from all adulteration, and that there is no material not a product of coal tar mixed with it.

Sixteen pounds of this was used per cubic foot. (West Taylor street had been laid in 1904 with blocks containing 12 pounds, and although a very heavy traffic was carried on a

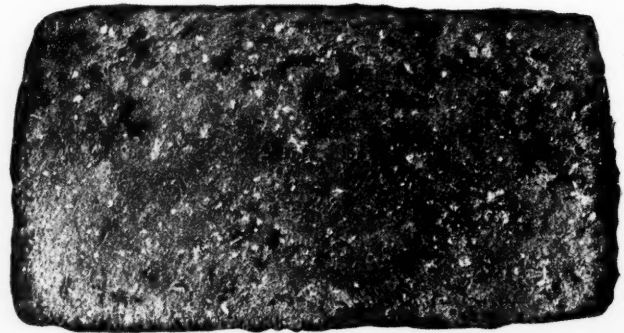


THE "LOOP DISTRICT" OF CHICAGO, SHOWING WOOD BLOCK PAVEMENTS

38-foot roadway, in which is located a double-track street railway, the pavement has shown no signs of failure.)

A strip 18 inches wide along railroad tracks, about the same width next to the curb and for a short distance around all manholes was laid with tar filler; but for the rest of the surface fine sand was used in the joints and the surface was covered with $\frac{1}{4}$ inch of coarse sand after completion of the pavement. Expansion joints were placed along each curb and transverse joints at intervals of 25 feet, except in portions of Randolph street and Wabash avenue, where the transverse expansion joints were placed 50 feet apart. These joints were composed of one inch of paving pitch specified to be the direct result of the distillation of "straight run" coal tar.

The pavements built in 1910 were given a crown of not to exceed 8 inches on roadways 60 feet wide, or 7 inches on roadways 48 feet wide. The reason for the flat crown was to prevent slipping on the smooth pavement. As the street grades were very flat, numerous sewer inlets were provided to draw off the water as rapidly as possible. The blocks were laid at an angle of 45 degrees with the line of the street, this being the general practice in Chicago; except that between railway tracks they are laid at right angles to the street. The blocks were laid as close together as possible and frequently straightened out into line with a sledge. In addition, the blocks in each line were pried into close contact with an iron bar and held in this position by substituting a longer block for a short one in the row. In spite of this, it was noticed that after applying the sand the joints opened up sufficiently to take a considerable amount of this. The blocks were rolled with a drum roller weighing about five tons when loaded with coal and water, the wheels being 41 inches wide. A good many blocks were broken in this rolling, and it was believed by the engineer that better satisfaction would be obtained if two rollers be



TOP VIEW OF BLOCK SHOWN BELOW



LONG LEAF PINE PAVING BLOCK, AFTER 28 YEARS' USE
Laid on Market St., Galveston, in 1875. Removed in 1903. Creosoted.

used, one a light roller, such perhaps as is used for asphalt paving, and the second a heavy roller, weighing at least ten tons.

The total amount of wood block laid in 1910 in Chicago was 63,857 square yards. It is not known yet just how much wood block paving will be laid this year, but the chief engineer reports that probably it will reach about the same amount.

Although the Tremont street pavement in Boston, laid in 1900, is sometimes cited as the first modern wood block pavement, Mr. Linn White stated last year before the American Society of Municipal Improvements that in 1898 a piece of wood block pavement was laid on Michigan avenue, Chicago, which was stated by the manufacturer to have been impregnated with not more than 14 pounds of creosote to the cubic foot. This pavement was down for ten years, and when taken up in 1908 on account of widening the street was apparently as good as when laid.

An even earlier instance of creosoted wood block paving is reported, such a pavement having been laid on Market street, Galveston, in 1875, and removed in 1903. This was creosoted long leaf pine, but we understand that the blocks were not rectangular nor was the pavement in other respects equal to the modern pavement.

PHILADELPHIA

In 1909, after the completion of a subway in Market street, Philadelphia, the merchants on that street, after considerable canvassing of the question, requested the authorities to use wood block in repaving. The first section so paved included about 58,000 square yards, which was begun on September 13 of that year and finished on December 11. In this pavement were used wood blocks which the specifications required to be treated with 20 pounds of creosote oil per cubic foot; but it was also required that they should not absorb more than 3 per cent of water, and to meet this requirement it was found necessary to use an average of 24 pounds per cubic foot, according to Mr. A. W. Dow. The blocks were 4 inches wide, 4 inches deep and from 5 to 10 inches long. They were laid on a sand cushion on a 6-inch foundation. A one-inch expansion joint was provided at each gutter and $\frac{1}{2}$ inch transverse expansion joints at intervals of 100 feet, these joints being filled with bituminous cement. The pavement was rolled with a ten-ton roller. The contract price was \$3.49 per square yard. In 1910 about 0.7 of a mile of wood block was laid under a ten-year guarantee.

CITIES WHERE WOOD BLOCK HAS BEEN LAID

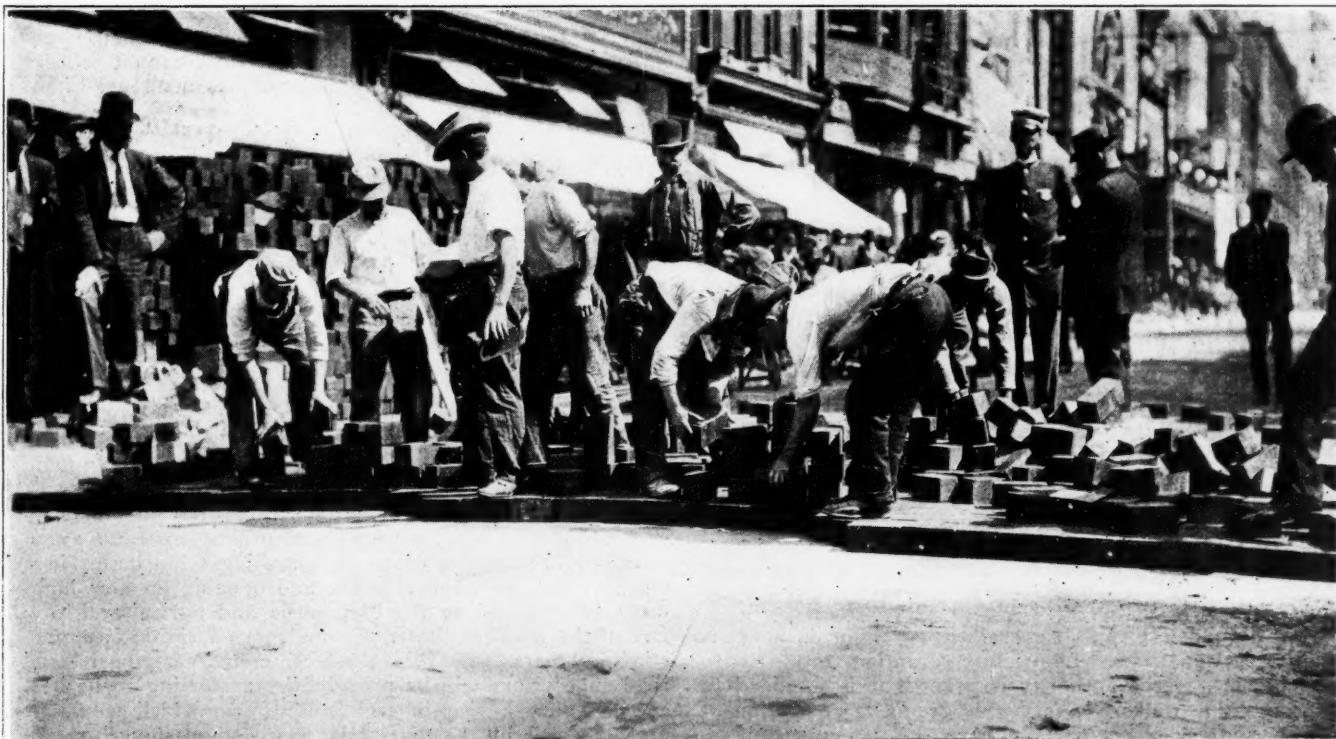
Including these instances of large amounts of wood block paving and also all cities where any amount whatever has been laid, we have prepared the following list which is believed to include practically all cities in this country which had laid any wood block paving up to the beginning of this year. It is possible that certain of those listed as having wood block paved streets have used this paving on bridges only, although an effort was made to list such cases separately under the head of wood block paved bridges.

CITIES HAVING WOOD BLOCK PAVED STREETS

ALABAMA—Mobile.
 ARKANSAS—Pine Bluff.
 CONNECTICUT—Bridgeport, Hartford, New Haven.
 FLORIDA—Pensacola.
 GEORGIA—Atlanta.
 ILLINOIS—Chicago, Decatur, East St. Louis.
 INDIANA—Indianapolis, Mishawaka.
 IOWA—Ames, Clinton, Des Moines, Ft. Dodge, Indianola, Mason City, Ottumwa, Perry, Shenandoah, Sioux City.
 KANSAS—Wichita.
 KENTUCKY—Lexington, Louisville, Winchester.
 LOUISIANA—New Orleans.
 MARYLAND—Baltimore.
 MASSACHUSETTS—Boston, Springfield.
 MICHIGAN—Calumet, Detroit, Grand Forks, Houghton.
 MINNESOTA—Albert Lea, Austin, Duluth, Little Falls, Minneapolis, Moorhead, Red Wing.
 MISSOURI—Cape Girardeau, Kansas City, St. Joseph, St. Louis.
 MONTANA—Billings, Great Falls.
 NEBRASKA—South Omaha.
 NEW JERSEY—Hoboken, Jersey City, Paterson.
 NEW YORK—Geneva, Jamestown, New York, Poughkeepsie, Rochester, Utica, Watertown.
 NORTH DAKOTA—Fargo, Grand Forks.
 OHIO—Cincinnati, Delaware, Springfield, Toledo.
 PENNSYLVANIA—Easton, Harrisburg, Philadelphia.
 SOUTH DAKOTA—Aberdeen.
 TENNESSEE—Bristol.
 TEXAS—Dallas, Houston.
 VIRGINIA—Norfolk.
 WASHINGTON—Seattle.
 WISCONSIN—Appleton, Beloit, La Crosse, Milwaukee, Superior, Watertown.

WOOD BLOCK PAVED BRIDGES

MONTANA—Missoula.
 NEW YORK—Baldwinsville, Ithaca, Mt. Vernon, Oswego, Seeley Creek.
 OHIO—Akron, Columbus, Mansfield, Montpelier, Newark, Philo, St. Marys, Stryker, West Milton.
 PENNSYLVANIA—Lykens, Tyrone.



LAYING WOOD BLOCKS ON MARKET STREET NEAR TENTH STREET, PHILADELPHIA

NEWS OF THE MUNICIPALITIES

Current Subjects of General Interest, Under Consideration by City Councils and Department Heads—Streets, Water Works, Lighting and Sanitary Matters—Fire and Police Items—Government and Finance

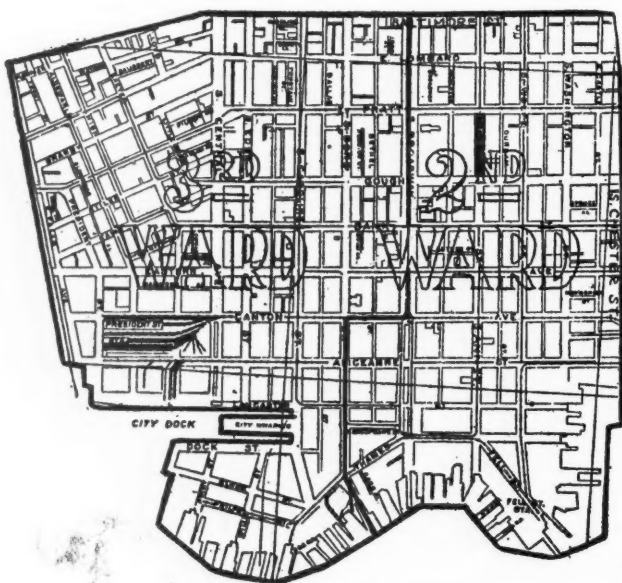
ROADS AND PAVEMENTS

Street Committee to Inspect Street Work

Atlanta, Ga.—The Street Committee of Council will devote a day to making a trip of inspection in automobiles throughout the city in order to see how the new street work is going forward and to decide where other work is needed. The Chief of Construction will accompany the Committee on this trip. The Committee will have a look at every piece of new street work that is being done in Atlanta, and will inspect every street for which improvements have been asked. The inspection will be one of the most thorough that any street committee has ever made. Bright and early the Committee will start on its trip and throughout the day will continue its inspection.

Inadequacy of Past Paving Plans Explained

Baltimore, Md.—The Baltimore News is publishing daily a series of maps of the city wards showing the futility and purposelessness of the present method of paving the city's streets from the inadequate general levy. The heavy black



MAP SHOWING YEAR'S PAVING

line shows the paving done and paid for by the city in the Second and Third Wards in 1909. The dotted black line indicates paving done in 1909 in the wards the expense of which was borne in whole or in part by abutting property owners.

Would Sprinkle Streets with Calcium Chloride

Duluth, Minn.—Alderman L. A. Barnes has received from the Board of Public Works a communication with recommendations for sprinkling the streets at West Duluth providing that the business district be kept free from dust at all times. This includes Central avenue from Main to Cody streets and Grand avenue from Central to Fifty-eighth avenue west. The communication also recommends that all streets not having a hard surface be sprinkled two or three times during the season with calcium chloride, which, it is believed, will assist greatly in laying the dust in the residence sections.

Extensive Street Improvements for New London

New London, Conn.—General street improvement is awaiting action of the Legislature, granting authority to issue bonds. If the authority is granted it is intended to lay granolithic walks five feet wide over a large section of the city and assess one-half the cost on the abutting property.

Good Road Nearing Completion

St. Augustine, Fla.—Within 30 days the county will be able to boast of a stretch of 66 miles of rock road, better than any road in the State of Florida. This will be when the contractors complete the county rock road through to Homestead. The last bond issue, carrying \$75,000 for new roads, \$15,000 for each of the five commissioners' districts, has all been expended or will have been when the work to Homestead is completed. There remain only about two miles more to be built to connect Homestead with the present rock road and a stretch of six miles to Silver Palm. The roads of the county will then be practically all new, with a few exceptions. There are a few stretchches between Miami and Fort Lauderdale that need renewing, but about 85 per cent of the main highways are in good condition.

Details of Du Pont Offer to Build Road

Wilmington, Del.—T. Coleman Du Pont has offered to finance the building of a highway across the State. He proposes to organize a company which should have power to condemn a right of way one or two hundred feet wide. The proposition contains the proviso that a portion of this right of way shall be reserved for the construction of a trolley line, pole lines for electric light and power lines and conduits for water, oil, gas, steam or anything desirable. The paved roadway would vary from 12 to 18 feet, according to travel anticipated in each section of the road. Space would be allowed for planting trees. On the completion of the road this strip, 30 feet wide, would be deeded to the State.

Street Paving Held Up

Walla Walla, Wash.—By the decision of Judge Thomas H. Brents, making permanent a temporary injunction restraining the carrying out of a paving contract, the construction of new pavements will be held up for several months, at least. Assessment paving has been done in Walla Walla under a law by which a quarter of the cost of the work was charged against a certain city fund. This fund became exhausted and the work of paving was continued, the property owners paying the whole cost. Recently a case came up in which property owners disagreed as to the material to be used and in consequence the matter got into the courts. The court holds that work cannot proceed under the law unless the city at large pays its share of the cost.

Improving Ohio State Highway Laws

Youngstown, Ohio.—Placing the State Highway Commissioner's office on a plane commensurate with the dignity of the State, systematizing existing legislation, repealing conflicting statutes and providing a better outlook for the good roads movement is the intent of a bill introduced in the State Senate by Senator S. B. McGuire, of Tuscarawas County. The measure bears every indication of being one of the most far reaching and important efforts at legislation during the present session of the Legislature and is of peculiar interest in Youngstown, where considerable opposition has developed to the policy of the good roads commission and where further roads work is now tied up by court proceedings. The movement for better roads in Ohio is being backed by the Ohio Good Roads Federation, a non-partisan, non-political organization, the members of which, business men, farmers and others, have no ax to grind and no motive other than making Ohio better in a business way by improving old and opening up new highways so essential to the mercantile and agricultural welfare of the Buckeye State. Compulsory education of county commissioners, township trustees, county engineers and road supervisors will be provided by a meeting to be held at least once a year in each county seat which would be presided over by the State Highway Commissioner, one of his deputies or a department engineer.

New Specifications for Street Paving

Dallas, Tex.—City Engineer J. M. Preston has prepared a new set of specifications and bidding sheet in the place of those that have been in effect for three years. The kinds of pavement provided for include creosoted wood blocks, bitulithic, asphalt, asphaltic concrete, rock asphalt and brick.

Fort Worth Interested in El Paso's Paving Plan

El Paso, Tex.—Fort Worth is interested in El Paso's revolving paving fund system. City Attorney W. M. Coldwell has received a letter from the authorities of that city asking that a copy of the charter of El Paso be forwarded. It is explained that Fort Worth anticipates the creation of paving districts and desires to follow the example of El Paso. Will Rand, of the bitulithic company, said recently: "El Paso's revolving fund is the best ever. With the original \$200,000 over \$400,000 worth of paving has already been laid."

Digging up Streets Presents Problem

Los Angeles, Cal.—How to properly fill, or to have filled, excavations made in the streets by contractors is a problem which just now is worrying the members of the Board of Public Works. Streets which have been dug up by contractors for the purpose of laying gas mains, sewer pipes, etc., and for connecting them with residences often show signs of never having been properly resurfaced and are filled with ruts and depressions. W. M. Humphreys, inspector for the board, explained that there are two ways in which the matter can be handled. One way is to either have the city fill all excavations and put the surface of the street in proper repair or else have city inspectors watch every excavation to see that it is properly filled. The other way is to make every contractor responsible for the condition of the street after he leaves it. The first-named plan of having the city do the work itself, or have every excavation inspected, would necessitate establishing an entirely new department of the city government and would result in large expense. The other plan is the one which is being followed now as nearly as possible, contractors who excavate being required to take out permits and then putting up either a certain amount of money or a bond to insure the street staying in good condition for at least a year. Inspector Humphreys informed the board that many streets which came under his observation would stay in good condition for a year after being excavated, and then would begin to show the effects of having been dug up. He thought the time of responsibility for the contractors should be extended as long as the life of the pavement.

Provision Made for Double Inspection

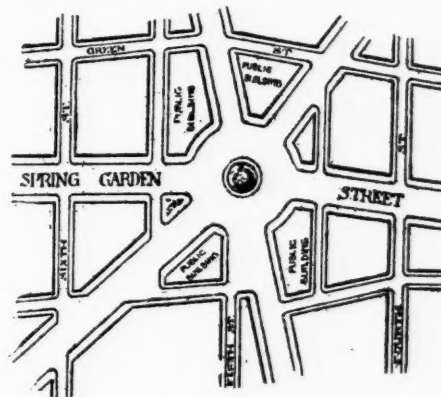
Cincinnati, O.—The final form of the new street paving specifications has been agreed upon at a conference between Public Service Director Sundmaker, City Engineer Shipley, Director Miles and Engineer Barlow, of the Bureau of Municipal Research. Most of the changes made were of a technical character. Provisions were inserted in the specifications for the appointment of an unofficial inspector by the service director, who shall have the same rights at the wood block manufacturing plants as the City Inspector except that of condemnation. It is agreed that samples may be shipped away for analysis, the only provision being that the City Inspector shall receive a sample from the same batch of oil shipped away, so that the city and the outside chemist will make their tests of the same quality of material. Director Miles declared after the conference that the specifications as amended were perfectly satisfactory to the bureau.

Able-Bodied Men Must Work on Roads

Cleveland, O.—The law made prominent by the recent decision of the Supreme Court to the effect that road superintendents and directors of public service can order able-bodied male residents of a community out on the roads for two days' work each year will not be met with an overflow of substitutes as was at first proposed, at least not in Cleveland. Mayor Baehr said that if it came to a show-down he himself would be ready to go out on the street for two days a year to work out his tax instead of turning over the \$3 for the pay of a substitute.

Improvements at Intersections of Diagonal Avenues

Philadelphia, Pa.—Upward of fifty neighborhood centers connected by diagonal avenues as proposed by the Comprehensive Plans' Committee, will form the basis of the general scheme for future development to be taken up shortly by the Board of Surveyors. The general project has been plotted, and hereafter ordinances for the opening of streets or striking others from the city plan proper will be considered in the light of the diagonal and neighborhood center



PROPOSED TREATMENT OF IMPORTANT INTERSECTION

recommendations of the Comprehensive Committee. There are already eight great diagonal avenues which run through 36 of the 47 wards, and new avenues will be laid out. The centers will be used for different purposes. In some will be located the headquarters of many branches of the city government. Some of the proposed centers are of such size as to furnish sites for schools and hospitals. In the congested districts playgrounds, drinking fountains, band stands and monuments may be located. The illustration shows one of the larger centers.

Camden Wins Paving Suit

Camden, Pa.—By the Court of Appeals affirming the assessment for the paving of Broadway, below Bulson street, Camden won a big victory in its controversy with the Manufacturers' Land and Improvement Company, after the matter had been in litigation for over three years. One of the points raised by counsel for the land company, outside of testing the constitutionality of the paving act, was that the street had been paved once by the land company and that the paving for which the assessment was made in 1908 was repaving, and that the city could not therefore make an assessment for it. City Council Bleakly insisted that there was a material benefit to the land from the new and improved asphalt pavement, and that the amount of this benefit was a lien upon the land and that if the Council had not made the assessment they would have neglected their duty. It is admitted that in the past Camden has not made assessments in these cases.

Planning to Call Roads Conference

Los Angeles, Cal.—A conference of supervisors of Southern California counties probably will be called in Los Angeles for the near future to take steps to secure for Southern California what is considered a just proportion of the \$18,000,000 road bonds voted by the people at the last general election. The question was raised at the supervisors' meeting by a communication from Ventura county supervisors suggesting that the Los Angeles board take the initiative in calling such a conference. The Ventura board suggested the coast road as one for general improvement. Members of the board unofficially endorsed the suggestion, and the matter was referred to R. W. Pridham, chairman of the board, to investigate.

Fifty Miles of Streets to Be Treated with Oil

Santa Monica, Cal.—The completion of three oil-paving contracts in the hill districts gives Santa Monica a total of about 50 miles of streets thus improved. The total mileage of open and traversable streets is 165, in a condition as a whole, says C. B. Pettis, Street Superintendent, that ranks the north beach city among the first for good roads in Southern California.

SEWERAGE AND SANITATION

No Lead Pipe to Be Used in Soda Fountain Connections

Denton, Tex.—State Pure Food and Dairy Commissioner J. S. Abbott, of this city, has issued a ruling that the use of lead pipe in making connections in sodawater fountains will be held a violation of the pure food and drug law of Texas.

Enforcing Sanitary Laws

Fort Scott, Kan.—State Pure Food Inspector Kleinhaus spent several days at Chetopa, making an investigation of the sanitary condition of some of the local places of business, and as a result a restaurant, a grocery store and a bakery were ordered closed until the proprietors complied with the sanitary laws.

Complete Sewer System for Long Beach

Long Beach, Cal.—Plans for the complete sewerage of the city have been submitted to the Board of Public Works by City Engineer Dewey. It is estimated that it will cost the taxpayers \$343,454.18 for this extensive addition to the present sewer facilities.

Bar Sewage to Protect Water

Toledo, O.—Action against property owners on the river road between the Children's Home and Delaware Creek has been taken by Service Director Cowell to enforce his orders that no more sewage from the included district shall be dumped into the Maumee. The purpose of the order is to protect the city water supply. The order includes the Children's Home, a county institution, and the Country Club. Twenty-three sewers empty into the river within the district included. Some of them lie below the intake of the filtration plant, but the infirmity director asserts that frequently the wind blows back beyond the intake crib the sewage coming from them. The law gives the Service Director power to prevent pollution of the stream from which the water supply is taken for a distance of 20 miles above the intake.

Towns Arrange for Exchange of Sewerage Facilities

Lynn, Mass.—A public hearing was recently held on a bill to authorize the city of Lynn and the town of Swampscott to make an agreement for the disposal of certain sewage. The act will affect about 30 citizens who live in the city and town where sewer entrance is possible only into a sewer under the control of the place in which the land is not assessed. The cost of the service is left to mutual agreement of the municipal authorities. The assessments will be levied in the municipality in which the property is located. There was no opposition to the passage of the bill.

WATER SUPPLY

Filter Ready at Jonestown

Lebanon, Pa.—Within a few days, it is expected, the great filter plant at Jonestown of the Lebanon Valley Consolidated Water Supply Company will be so far advanced toward completion as to permit the delivery of filtered water to the company's patrons in the suburbs of this city. The plant is said to be one of the finest water filtration systems in the country. On it and the pipe lines it will supply have already been expended over \$300,000, and the total to be expended on the system when complete will be in the neighborhood of half a million dollars. The system takes the Swatara water at a point not far north of the Jonestown railway station, and after passing through a settling or sedimentation basin that takes out of it the impurities in suspension the clear liquid is taken through the regular filters and completely purified. Later it goes to a closed well, concrete lined, from which it is pumped up the four-mile grade to the big concrete reservoir on Sand Hill. The Sand Hill Reservoir is a big closed basin. From the time the water enters the filters until it is delivered in the home of the consumer it is not exposed to the light of day. The Sand Hill Reservoir is so constructed that the water in it is kept constantly in motion in a concrete covered reservoir.

Fight Filtration Order

Lima, Ohio.—Mayor Dyer, Director Rowlands and City Solicitor McLaughlin visited Cincinnati, where they met with the State Board of Health and filed an appeal from the recent order of that Board commanding the city to build a filtration plant.

January Record of Cincinnati Filtration

Cincinnati, Ohio.—Superintendent Laidlaw has received the report on the chemical analysis of the Ohio River water for January. The report showed that the highest number of bacteria was found on Jan. 3, when the count was 360,000 to the cubic centimeter. The lowest was on Jan. 26, with a count of 6,700, and the average for the month was 63,000 to the cubic centimeter. The average for the filtered water was 11 to the cubic centimeter, showing a filter efficiency of 99.98 per cent. On four days no bacteria was found in the filtered water; on five days only one to the cubic centimeter was found; on one day two, on two days three and on seven days but four. On the day of the greatest impurity in the raw water the count for the filtered water went to 110, which is but 10 above the standard German average of 100.

Cranford Has Water Supply

Cranford, N. J.—Cranford apparently has located a sufficient water supply for the town, and within 10 days' time a complete report from Special Engineer Fuerties is expected by the Township Committee on the number of gallons the two driven wells will supply and the cost of building a complete water plant. The question of municipal ownership of a water plant will be submitted to the voters in April. Engineer Fuerties reported to the township officials that the first well driven to a depth of 216 feet flows within three feet of the top and that the new well was completed at a distance of 220 feet, with over a thousand gallons of water flowing over the top in a day's time. Engineer Fuerties reported that the second well had every prospect of yielding better than the first one. The first well produced 300,000 gallons a day on a six-day test.

Long Beach Citizens Voice New Water Rate Objections

Long Beach, Cal.—During a recent discussion of water rates by the City Council and citizens who crowded the Council chamber, there were openly expressed hints at having the people take the fixing of rates out of the Council's hands by means of the initiative and referendum. It was a very lively and interesting session and resulted in the Council postponing action for one week. The chief cause for complaint voiced by the citizens was the alleged reduction offered in water for domestic uses where meters are used. The present rate is 20 cents per thousand gallons. The new ordinance proposes the same rate for quantities less than 10,000 gallons; 15 cents between 10,000 and 90,000 gallons, and 8 cents per thousand for users of more than 90,000 gallons.

Filtration Plant a Success

Toledo, Ohio.—After almost a year's operation Service Director Cowell and water works officials have found the process of the Toledo filtration plant to be entirely satisfactory. After a number of minor structural changes have been made the Norwood Engineering Company, which built the plant, will be released from its \$240,000 guaranty bond at the expiration of the year's period, March 23. The matter has been discussed by the Service Director and W. A. Stevenson, representative of the company, and the changes to be made were ordered. None of them, Mr. Cowell said, is of great importance. Mr. Stevenson said that work on the erection of the 14 additional units of the filtration plant will be begun as soon as the plans are completed and approved by the State Board of Health.

Court Stops Reservoir Work

Tyrone, Pa.—Alleging that the big reservoir which a water company is building to supply Tyrone is a menace to the citizens because the breast is not of sufficient strength to hold the contents with safety, the Borough Council has applied to the Court for an injunction restraining further work on it. A preliminary injunction was granted.

STREET LIGHTING AND POWER

Explosion in Power Plant

Niagara Falls, N. Y.—Without a moment's warning a terrific explosion wrecked a penstock at the power house of the Ontario Power Company, near Queen Victoria Park, on the Canadian side, killing three men instantly, fatally injuring two and seriously hurting five others. General Superintendent Hugh H. Wilson stated that the loss aside from the fatalities would be trivial, possibly not exceeding \$5,000. Discussing the probable cause of the disaster, Mr. Wilson said that so far as could be ascertained at this time the explosion was due to a leaking gas pipe. There is a small gas line within the penstock for heating purposes and it is thought that gas escaping from this pipe produced the fatal combustion.

Grounding of Secondary Wires Advised

Hingham, Mass.—Wm. L. Puffer, Consulting Engineer, Boston, has made a report to the Municipal Lighting Board recommending the grounding of secondary wires. In answer to a specific question, "grounding" is defined as the deliberate connection of one of the secondary wires to as good earth as can be found. The report states that it is desirable to ground these wires wherever there is a possibility of exposure to stray currents coming from dangerously high voltage wires. The wires carrying the railway currents, the series street light currents and the primary currents of the lighting system are classed by Prof. Puffer as dangerous. He advises the grounding of the secondary systems to the cast-iron water pipes as near the transformers as possible at all services where it can be done conveniently. In other sections of the city where the water pipes are not cast iron and subterranean water is known to exist, pipes should be driven into the ground and the secondary wires connected to them. These pipes should be tested to see that the ground connection is sufficiently good before the wires are connected.

Columbus May Abandon Arches and Adopt Clusters

Columbus, Ohio.—Columbus business men are positive in expression of opinions for and against the present system of High street electric arches, many being in favor of abolishing the present arches and adopting a more up-to-date plan. Several state that the old style arches have long ago passed their days of usefulness and it is time for something newer and better. South High street business men, where the first arches were erected, still favor the present arches, but it is generally felt that some other kind of lights would be preferable. Cluster lights such as have been installed on East Main street and which are generally used for up-to-date street lighting are suggested.

Mayor and Aldermen Take up Subscription to Pay Contempt Fine

Clay Center, Kan.—The costs of the contempt case of Mayor Hanna and the City Aldermen of Clay Center, which the United States Supreme Court recently ordered the men to pay, will be raised by popular subscription among citizens here. No one will be permitted to give more than a dime. The costs are \$27.60. The municipal officers last November cut down the poles of the Williamson Electric Light Company here before a decision of the Supreme Court of Kansas against the company had stood the necessary 30 days to become effective. Thus did they get into contempt. No penalty besides the payment of the costs was exacted.

Learn the Cost of Street Lights

Lansing, Mich.—When Secretary W. B. Kirby, of the Water and Electric Light Board, reported that the first cost of the Tungsten lighting system now in use in the business districts was but \$11,407.36, general satisfaction and surprise were expressed. In all, the system includes 263 poles, of which 77 have a cluster of five lights and the other 186 three lights. The cost of each pole was \$18; the cost of the cable from pole to pole was \$11.54. The painting, wiring, globes, etc., made the total cost for the three-light poles \$42.30, while that of the five-light poles is \$45.92.

FIRE AND POLICE

Mayor's Gift to Town

Branchville, N. J.—Mayor John H. Nelden formally presented the hose cart he purchased some weeks ago to the borough at a meeting of the Council last week. Councilmen D. L. B. Smith, Truman Compton and Wilbur F. Dye, in turn voiced their thanks on behalf of the town.

Jersey City Has Auto Fire Truck

Jersey City, N. J.—Jersey City's newest fire station, at the Boulevard and Van Nostrand avenue, Greenville Heights, was opened for duty last week. It is equipped with automobile fire fighting apparatus of the latest design and the first to be used in this city. The automobile equipment consists of a combination truck, which carries a 40-gallon chemical tank, 2,000 feet of hose and two extension ladders of 25 feet each. When light this truck weighs 5,500 pounds and is driven by a 50-horsepower motor, with a guaranteed speed of 50 miles an hour. Battalion Chief Chambers will be in command.

Ordinance Regulates Sale of Firearms

Louisville, Ky.—Chief of Detectives Capt. John P. Carney has prepared an ordinance regulating dealers in firearms. The measure provides that stores dealing in firearms or ammunition must register every sale, giving the number of the arm sold, the make, the caliber, the amount of ammunition purchased and the name and address of the purchaser. Captain Carney says that there is no law of the kind now in force in Louisville. He feels certain that such a law would be a great benefit to the police and detective departments in reducing crime. Captain Carney points out that the dealers would benefit by the passage of the ordinance, inasmuch as they would know the number of their firearms and could furnish them to the police department in the event that they were stolen, thus helping the department to trace them. In cases of murder or suicide the name of the owner of the weapon would be a valuable assistance to the police. The police would also be in possession of the names of all the firearm owners in the city.

Policemen to Wear Uniforms at All Times

Rochester, N. Y.—As a result of a recent discussion of the affairs of the Rochester Police Department by Commissioner of Public Safety Charles S. Owen and Chief of Police Joseph M. Quigley, it will be suggested to the members of the department, and especially to those above the rank of patrolman, that uniforms be worn in public at all times, except when permission is given by the Chief to policemen to appear in citizens' clothes. All members of the Police Department, except the detectives and patrolmen assigned to plain clothes details, are now required to wear their uniforms when on duty. The patrolmen and officers of the department may wear civilian clothes on their days off duty and on furlough, upon being given permission by the Chief to do so.

Some of the patrolmen who are on duty in the day time have a habit of appearing in public in their civilian clothes in the night time. Some of the captains and the lieutenants also have acquired the habit of leaving off their uniforms when quitting the station houses for their meals. Some even occasionally appear on duty without their uniforms.

Million Dollar Fire in Minneapolis

Minneapolis, Minn.—Losses of more than a million dollars were suffered in a fire which swept the Syndicate Block, Nicollet avenue, Sunday morning, March 5. More than a score of lives were imperiled and thrilling rescues were made by the firemen. The Donaldson block caught fire, but was saved by the sprinkler system. The buildings across the avenue were saved with difficulty, as it was, the roof and upper story were burned. Three fire companies came to the aid from St. Paul. Chief Strapp made the trip from the business district in St. Paul in 15 minutes. Crowds of people visited the scene on Sunday afternoon and were surprised to see among other things that the ornamental Corinthian lighting standards stood intact, although the building on the opposite side of the street was severely scorched.

Installing Danger Signals

Portsmouth, Va.—Danger signals are being installed at High and Court streets, Effingham and London streets, and Washington and South streets by Superintendent Smith of the city's fire alarm telegraph system. The signals are intended to light simultaneously with the fire tap of the fire alarm gongs in the engine houses of the Chambers Fire Company, No. 2, in Court street, the Park View Engine Company, No. 3, and the Independent Fire Company, No. 1, and are to warn approaching street cars of the movements of fire apparatus. The signals consist of two red electric incandescent globes suspended over the center of the roadway and the traction tracks.

Hauling Steam Engine with Auto

Walla Walla, Wash.—Fire Chief William Metz and the firemen have been testing out the Metropolitan steam engines as to their state of efficiency so that in case of emergency the fire-fighting equipment of the city will all be in trim for immediate use. Instead of hauling the engines about with horses they were trailed behind the 80-horsepower fire auto and the big car shows the drawing capacity of a locomotive. One of the steamers was taken up East Alder street behind the auto at the rate of 15 miles an hour, and so far as could be judged, without any strain on its motive power.

Policemen Receive New Book of Rules

Providence, R. I.—The Board of Police Commissioners has distributed a new book of rules among the members of the force. Included in the advice to a young policeman are the following recommendations:

"Remember that you are the servant of the people."

"If you don't like your job, resign, but don't attempt to influence anyone to make your duties easier."

"Don't forget that when you were appointed there were many others who would gladly have taken the position given to you."

"Accept no favors from anyone, pay for what you get, and don't be chummy with loafers or lawbreakers."

"Vote as you please, and don't think you can merit or secure promotion by being a politician."

Girl Fire Chief of City

Port Tampa, Fla.—Miss Maggie Harris, daughter of the late Fire Chief A. J. Harris, of Tampa, has the distinction of being the first girl in the world to be called upon to organize a fire department. Miss Harris will organize a volunteer department for Port Tampa City. Several severe fires recently have awakened the citizens and officials to the need of protection. About 40 men have volunteered their services. The men selected will be thoroughly drilled by Miss Harris. The late Chief Harris resided in Savannah for a number of years, during which time he was connected with the old volunteer department. He moved to Tampa when the Tampa department was reorganized and became its chief. Miss Harris was secretary to her father during his career, and took a deep interest in fire-fighting.

New Apparatus Given Test

Janesville, Wis.—The new chemical apparatus recently purchased by the city and placed on the fire chief's auto, has been tested for its efficiency. The tank was charged and put in operation and a nozzle an eighth of an inch in diameter was used with the hose coming with the equipment. The charge lasted for about fourteen minutes, but lost a good deal of its strength after the apparatus had been used about ten minutes. A pressure of 155 pounds was secured at the outset of the trial. It has been decided a large stream will be of more service in fighting small blazes and hereafter a three-sixteenths inch nozzle will be used. This, it is expected, will throw a stream of sufficient force for about four minutes, by which time the fire wagons or the fire patrol will be at the scene of the fire, or if necessary the reducer attached to the equipment on the chief's auto and a stream of water used in extinguishing the blaze. The auto with the equipment was weighed this morning and tipped the scales at 3,350 pounds. The auto alone weighs 2,720 pounds, making the weight of the chemical apparatus 630 pounds.

New Auto Engine Makes Good Record

Paterson, N. J.—Engine No. 10, the new automobile fire engine, covered 52 miles while answering fire alarms during the month just passed, and in many cases, although a long distance from the fires, came in not far behind the regular apparatus. In some cases it would have been able to get to the scene first but racing is forbidden by the rules of the department so that if it were last in the stretch it was obliged to retain its position. During this time 16 alarms of fire were answered.

New Chemical Engine Used for First Time

Two Harbors, Minn.—The Fire Department was called out one day last week to put out a fire at the Carey residence on Sixth avenue. It was only a small fire, caused by sparks falling on the roof, and was easily extinguished. For the first time the chemical engine purchased by the city was used and proved very successful, 100 pounds pressure being generated in about four seconds.

GOVERNMENT AND FINANCE

Wants Smaller Council

Richmond, Va.—Holding that the two branches of the Council are too large and are unwieldy, Councilman Clyde H. Rotchiffe has proposed a resolution to reduce the number from 64 to 24. He proposes to divide the city into three wards, instead of eight, allowing each ward three members of the Board of Aldermen and five Councilmen.

Many of the politicians oppose the plan because they will lose their prestige, while the business men favor the change. The possibility of the city changing to the commission form of government may have something to do with the suggestion at this time. The charter of the city would have to be amended to secure the result desired by Mr. Rotchiffe.

Chief of Statistics Calls Municipal Financiering Reckless

Boston, Mass.—Charles F. Gettemy, Chief of the Massachusetts Bureau of Statistics, has reported to the Senate that in 15 cities and 156 towns examined by his Department in response to an order of the Senate there is a total of \$1,124,231.98 municipal indebtedness and no provision for meeting it. Wholesale and indiscriminate borrowing from individual, trust funds, cemetery funds, Chief Gettemy reports, has plunged the cities and towns of the commonwealth into hopeless confusion from which the Legislature will have to rescue them. Mr. Gettemy intimates that there is a shadow of illegality resting upon some of the loans made apparently in accordance with the law. Borrowings amounting to nearly half a million are made from trust funds left for town improvements, but appropriated by the towns for current expenses. Towns are paying 6 per cent upon these misappropriated funds. Several towns have asked for legislative permission to refund. In some cases, however, refunding must be gradual so as not to financially wreck the present taxpayers. The proposition for a State finance commission is urged to meet the situation. The ruling of ex-Attorney-General Malone that towns which have borrowed in this way must regard such borrowings as narrowing their debt limit makes it impossible for them to borrow further without legislation.

Favors Municipal Ownership of All Public Facilities

Columbus, Ohio.—Mayor Marshall has declared for municipal ownership of all public utilities in a speech on the gas rate matter. At present there is municipal ownership of the light, water, sewage and garbage disposal plants, but the Mayor hopes also to effect ownership of gas, telephones and street railways.

Elect Councilman by Toss of Coin

York, Pa.—After four ballots taken by the West York Borough Council for the election of a successor to Councilman C. L. Green found the body still deadlocked, John Shive was chosen for the vacancy by the unusual method of flipping a coin. His opponent for the office was John Horner. Each of the candidates had received three votes in the four different ballots and after Burgess Luther E. Newcomer had tossed up the penny which decided the contest the action was made legal by the taking of another ballot in which all votes were for Shive.

Bermudez Road Asphalt

"It Stays Put"



Bermudez
Asphalt Lake
Venezuela

This is the Bermudez Asphalt Lake from which is obtained Bermudez Road Asphalt—the only **lake** asphalt macadam binder.

The lake is nature's storehouse of **natural** asphalt. Here tropical suns and equatorial storms have reduced Bermudez to an unchangeable material.

This "treatment" has eliminated every volatile element from Bermudez and left a stable bitumen, which makes the only road binder that is proof against heat, cold and water.

All substitutes for Bermudez (tars, oil residuums, and by-products) are **man-made**; and it is impossible for man to accomplish in a few hours what nature has required ages to achieve. The only real asphalt of known and unchanging qualities is **lake** asphalt.

The long duration and severity of nature's own processes explain why Bermudez Road Asphalt is not affected by climatic changes, and does not bleed, volatilize, and allow the road to ravel.

Bermudez lasts as long as the stone lasts.

Road Department

THE BARBER ASPHALT PAVING COMPANY

Bermudez Road Asphalt

"It Stays Put"

Laying a
Bermudez Road
Wilmington,
Del.



Bermudez Road Asphalt

(as explained on the preceding page) is a known quantity of **unvarying** qualities. It is not a tar, oil residuum, or a by-product.

It builds smooth, permanent, dustless highways, as distinguished from unstable makeshifts that cost more in the end, require constant maintenance, and are at no time satisfactory.

Bleeding and volatilization of the binder eventually leave a road without any binder whatever. The hottest sun does not draw Bermudez to the surface of the road. It does not volatilize and lose its binding qualities after a few seasons' wear and weather changes. **It is not necessary** (as is the case with other binders) continually to cover Bermudez roads with screenings or gravel to absorb exuding pitch.

In fact, **Bermudez roads require practically no maintenance.**

The life of a bituminous macadam road depends upon the life of the binder. Bermudez Road Asphalt is indestructible.

Two hundred miles of Bermudez roads in the United States and foreign countries prove these assertions.



Durkee Avenue, Jacksonville, Fla.
Shell road, resurfaced with Bermudez

Road Department

THE BARBER ASPHALT PAVING COMPANY

Bermudez Road Asphalt

"It Stays Put"



Winthrop St.
Taunton, Mass.
Constructed
with Bermudez

All Kinds of Roads

but especially those that must withstand heavy traffic, last longest when constructed with Bermudez Road Asphalt.

Whatever the conditions may be, Bermudez Road Asphalt is available. It is used either by the penetration or mixing process with stone, and by mixing with gravel.

Old roads with stone, gravel, shell, brick, concrete, or any base that provides a stable foundation, may be economically resurfaced by the use of Bermudez Road Asphalt. We should like to tell you more about this class of road work, of which we can show many successful examples.

For city boulevards, park drives, and town streets, Bermudez Road Asphalt provides a pavement that costs much less than any other permanent roadway.

Where the conditions demand great resistance to the effects of automobile traffic, Bermudez asphalt roads meet every requirement for dustless, durable, moderate cost highways.



Hudson-Hollowville Road, New York
Constructed with Bermudez

Road Department

THE BARBER ASPHALT PAVING COMPANY

Bermudez Road Asphalt

"It Stays Put"

Bala Turnpike,
near Philadelphia.
Macadam resurfaced
with Bermudez



Every Road is a Problem

by itself. We offer the experience and facilities of this Company for the solution of **your** problem.

No other organization has had so wide an experience or controls such perfect facilities. Nor does any other organization employ so large a corps of field and laboratory experts.

Our product and our work are the results of a long and costly **evolution**—not of an attempt to adapt any one material to modern road building—for this Company is in possession of extensive supplies of every known bituminous product—but to discover what was **best**.

Now we **know** and the results of our experience and experiments are at the disposal of everyone interested in good-road building.

Specifications and detailed information may be had for the asking.

But first of all send for the new Bermudez Road Book.

Road Department
THE BARBER ASPHALT PAVING COMPANY, PHILADELPHIA, PA.
Offices in all Principal Cities

STREET CLEANING AND REFUSE DISPOSAL

Garbage Disposal Faulty

Erie, Pa.—While City Health Officer J. W. Wright believes the backbone of the typhoid epidemic has been broken, a secondary outbreak may be even worse unless action is taken immediately relative to garbage disposal. The present system, he says, is a menace to the city. Three months work and \$75,000 will be required to establish a new system. The Water Commission has voted \$10,000 to assist in waging war against the epidemic. Every trained nurse that can be secured in Northwestern Pennsylvania is being employed here, and many are being brought from Pittsburg, Philadelphia, Buffalo and Cleveland. Between Jan. 1 and March 1 the fever claimed 84 victims, one for every 750 persons in the city. There were 744 cases.

Plan to Make Garbage Haul Itself by Rail

Atlanta, Ga.—A plan whereby the city's garbage can be made to haul itself to the crematories which the city is going to build in the near future will be considered by the special committee having the matter in charge. The plan is to install at each of the two proposed crematories a plant consisting of boiler, steam engine and electric dynamo, and by the joint operation thereof to develop power sufficient to run electric garbage trains on tracks to be built by the city from receiving stations at opposite ends of town to the crematory plants. It is estimated that the burning of the garbage at each crematory would produce ample heat to drive an electric plant powerful enough to pull the garbage trains.

Garbage Will Be Removed by City

Portsmouth, Va.—The Street Committee of the Council has taken over the work of the removal of garbage, and C. E. Murden has been engaged to supervise its collection. Heretofore the work of removing garbage has been done by contract, but the Street Committee believes that it can save money to the city by taking the work over and the new plan will be tried for a year.

City May Build Reduction Plant

Cincinnati, Ohio.—Mayor Schwab and Service Director Sundmaker are securing data in an investigation of the advisability of constructing a municipal reduction plant, when the present contract with the Cincinnati Reduction Company expires in June, 1913. The Mayor is of the opinion that the collection and reduction of garbage by the city might be done at a reduced cost from what is paid in the contract. The Mayor's attention was called to the matter when the hospital commission made arrangements for garbage incinerators for the new Avondale Hospital. They have secured a furnace which reduces all classes of garbage to ashes at a slight cost and without any offensive odors. The cost of the contract with the present contractor has steadily advanced each year from \$76,000 in 1903 to \$93,000 last year.

Recommends Incineration of Rubbish for Columbus

Columbus, Ohio.—Superintendent I. S. Osborn has made a report to Mayor Marshall outlining a plan for the disposal of rubbish, ashes and manure. He figures that \$63,380 will pay for collection and \$5,836 for disposal as compared with \$150,000, the estimated cost of disposition by private contract. By operating the plant in connection with the workhouse \$4,000 more may be saved. The present cost of removing rubbish is estimated on a cost of \$3.77 per residence for 40,000 residences. The item cost of collection includes \$18,600 for collecting manure, which Director Holton says can be made self-sustaining. To accomplish the results stated by Osborn an incinerator and utilization plant will have to be built. The incinerator is figured to cost \$36,000, and the utilization plant, which will consist of a building, conveyors, etc., where the portions of the waste which have value, such as rubber, leather, bottles, etc., may be picked out. The cost of operating incinerator and utilization plant is \$16,120, revenue from steam generated and sale of valuable materials, \$10,284; net cost, \$5,836, as stated. Mayor Marshall states that 100 deaths a year from communicable diseases will be avoided if the street sweepings and rubbish are disposed of in a sanitary manner.

Wants Change in Garbage Contract

Huntington, Ind.—To change the time of the expiration of city garbage collection contract to June 30 is a plan considered by Councilman Harmon Hendricks and he will probably introduce a resolution in the Council to bring about such a change after the present year. According to the present custom, the garbage collector assumes the task January 1, a time at which the work is the most difficult of the year. Before a plan of disposing of the refuse is well worked out, residents in some parts of the city usually bring in complaints of neglect. It is to correct this and to give the new man an opportunity to commence work during the warmer weather that Hendricks proposes the change.

Bill Purposes Economy in Street Cleaning Work

St. Louis, Mo.—A bill reorganizing the street cleaning divisions of the Street Department by combining the cleaning of hard pavements and the block patrol was introduced in the House of Delegates last week by Delegate Hildenbrandt at the request of Street Commissioner Travilla. The bill reduces the number of employees from 71 to 60 and the salary roll from \$67,464 to \$56,640, a decrease of \$10,824. Street Commissioner Travilla states that with the addition of three automobile runabouts to the equipment of the departments its efficiency would be largely increased. The bill substitutes for two superintendents at \$150 a month each, one superintendent at \$200 a month and makes similar combinations in the lower positions. The two departments can very readily be combined, as the inspectors cover the same areas while inspecting different matters.

To Demonstrate Incinerator Plant

Mason City, Iowa.—W. H. McGuire, of Oklahoma, is expected in the city shortly to demonstrate his incinerator plant. The sewage of the city as it now is empties into Lime Creek, and when the water is low a protest goes up from residents far down the stream. There has been talk of injunction proceedings time and time again, but nothing has been done. The system has been put in at a very heavy expense, but there can be no question that some other plan to take care of the sewage must be made soon.

Garbage Reduction Resumed at Bridgeport

Bridgeport, Conn.—The garbage reduction plant to be operated by C. C. Fischer, York, Pa., has been got in condition promising the beginning of active work March 15. Beginning that date it is expected that everything will be in readiness to receive garbage for reduction. For the past ten months the city has been obliged to bury its garbage. The town farm has been used for this purpose.

The operation of Fischer's plant will be watched with interest by East Side residents. Fischer's contract has a clause making a limit for the odor zone and, judging from the opinions of East Side residents, this clause will be enforced. There is a difference of opinion as to whether John B. Livingston, former head of the Bridgeport By-Products Company, or the city, will press their heavy damage suits. Nothing has been done concerning them for a long time and interest has somewhat been overshadowed by speculation as to how Fischer will succeed.

Municipal Garbage Plant

Winnipeg, Manitoba.—Chief W. J. Bailey, Department of Sanitation, who has been in charge of a 100-ton Dixon crematory for a short time—with the aid of convict labor, by the way—says in his report, in part: "From the first of the month to the present date we have consumed on an estimated average of from 6 to 75 tons of mixed refuse daily, all loads being dumped into the machine, and all non-combustible refuse, etc., being hauled from the machine the following morning with the ashes. We are burning coal in this machine, for which we pay the sum of \$3.65 per ton in lots as we require it. We have two paid men at work, all other labor being furnished by the city prisoners, they being worked by this department. Our highest rate of operation per ton of garbage, etc., consumed thus far has been \$0.219. The percentage of ashes, tin cans, etc., is about 15 to the 100 loads.

RAPID TRANSIT

City of Trenton Gains Decisive Victory for Good Trolley Service

Trenton, N. J.—Under orders and recommendations issued by the Board of Public Utility Commissioners of New Jersey to the Trenton Street Railway Company, the city of Trenton gains a decisive victory in its efforts to have the trolley service of the city materially improved. The orders are of such a character that safe and adequate service is guaranteed throughout the city within two years and the recommendations provide suggestions to the company, which, if adopted, will prevent a return to the present conditions. All of the reconstruction work ordered must be started on or before April 5 and completed during the year 1911. All of the rest of the work ordered must be started on or before April 5 and completed before the close of 1912. The orders demand complete reconstruction of parts of the system of tracks of the company on Hamilton avenue and South Broad street, and the repair of all joints in tracks in seven sections of the city. It prescribes the manner in which the joints shall be repaired in order that depressions which now exist shall not recur.

Municipal Ownership Bill Dies in Committee

Columbus, O.—The Geleerd bill which would have given the people of the municipality the right to own and operate its own street railway lines was defeated in the House cities committee last week. The defeat of the bill was in a large measure due to the exposure of the rider incorporated in its provisions, giving municipally owned street car lines rights to public streets without the consent of abutting property owners. This rider was similar to the one discovered in the Krause bill, which will probably meet a similar fate when it comes up for a third reading in the Senate this week.

MISCELLANEOUS

Gift of 10,000 Catalpa Trees to Woonsocket

Woonsocket, R. I.—James M. McCarthy, head of the McCarthy Dry Goods Company, of this city, who has been greatly interested in the subject of the benefit resulting from the intelligent work in recent years of Tree Warden Edwin O. Ronian, announces that the McCarthy Company will present to the city through the school children of Woonsocket 10,000 hardy Alice Catalpa trees. They will be ready for distribution in time to be planted next Arbor Day, which comes on May 12. They will be one year old and 12 to 15 inches high. The hardy catalpa trees are especially valuable for their rapid growth and shade-giving branches. According to the offer made by Mr. McCarthy to Superintendent of Schools Frank E. McFee, and which will be announced at the next meeting of the school committee and to the parochial schools, there will be cards of instruction as to planting and care of the trees attached to each tree. The trees that will be distributed grow rapidly. Their growth keeps pace with that of the individual and by the time some of the children who plant them attain manhood or womanhood they will find their tree abundant with foliage and 40 feet high. The only stipulation that accompanies the gift is that each child receiving a tree must plant it and promise to care for it. This gift will lend an unusual significance to a notable anniversary and the fruit of it will be apparent in Woonsocket for generations yet to come. Alice Catalpa tree roots well and thrives in almost any kind of soil.

South Bend Plans New Zoological Garden

South Bend, Ind.—In preparation for the launching of plans for the new \$3,500 animal zoo for Leeper Park, members of the City Park Board spent a day last week in Chicago on a tour of inspection. The Park Commission spent the greater portion of the day at Lincoln Park, where many valuable hints were secured for the construction of a thoroughly modern zoo in Leeper Park. The Common Council has appropriated the amount for the improvement in its annual budget and work will begin on the new building in a short time. An architect is to make plans of the building immediately.

New Municipal Dock Opened

Tacoma, Wash.—Tacoma's temporary municipal dock has been formally opened, several thousand persons—men, women and children—participating in a big house warming to celebrate the occasion. The affair was notable in point of interest displayed and members of the Business Men's Dock Committee were more than delighted with the success of the event, according to E. R. Rogers, chairman of the committee. Following an inspection of the building—and no nook nor corner was overlooked—the visitors gathered in the big freight room, and, standing, listened for an hour and a half to a program of addresses by prominent men.

Woodlawn Opens City Hall

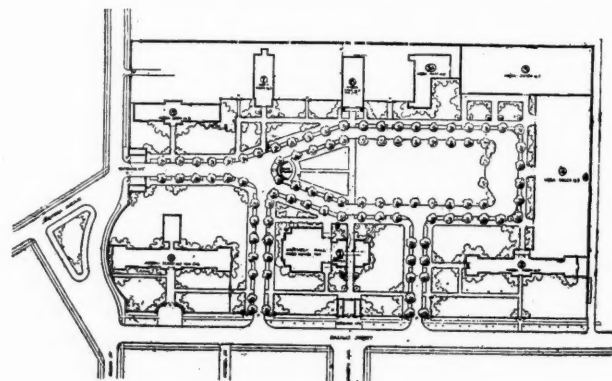
Woodlawn, Pa.—The new borough hall at Woodlawn was opened to the public last week and 1,800 persons, including 600 school children, marched through the building. Officials of the Jones & Laughlin Steel Company were present, and a band of employees of the company furnished music. The building is a three-story buff brick structure, erected at a cost of \$29,000.

Macon Plans for Child Welfare

Macon, Ga.—Macon will be among the first of Southern cities to establish a municipal playground for its youthful population. The field secretary of the National Playground Association has begun the work of inaugurating the playground on Tatnall Square. The city has already appropriated \$3,000 for improving Tatnall Square for this purpose.

Plan of Rochester's New Exposition Park

Rochester, N. Y.—The plan of the new Exposition Park, one of Mayor H. H. Edgerton's favorite schemes, was made by Architects Gordon & Madden. The landscape work is being done by Pitkin & Weinrighter. The improvements will cost about \$150,000. The new park will be about 15 acres in extent and the stone wall by which it is surrounded will be removed and an ornamental iron fence substituted. The Bloss street extension will be in the form of a convex curve, which will leave plenty of space in front of the old Girls' Dormitory. The driveway at the main entrance on Bloss street will be 30 feet in width and will divide at the bandstand and run northerly 20 feet wide on either side



EXPOSITION PARK

of an esplanade, which will front the three exposition buildings, numbered two, three and four. The esplanade will be 304 feet long and 148 feet wide. Trees and walks along the lawn will make it one of the prettiest spots in the city. There will be nearly a mile of cement walk and about one-half mile of driveway in the new park. Building No. 6 will be the aquarium and No. 7 will be the zoo building. Building No. 8 will be used as a vocational school. No. 3-a will probably be used for storage purposes. The Mayor admits he has a plan for the utilizing of Building No. 9, but declines to say anything about the matter, except that when finished it will be one of the most attractive buildings in the park. Building No. 1 will be the Assembly Hall, with a seating capacity of 1,200. Besides the main entrance on Bloss street there will be two entrances to the park from Phelps Street.

Foreign Labor Not Wanted in Centralia

Centralia, Wash.—Following the decision by the City Council of Chehalis that none but American citizens could work on city improvements, a large number of aliens have come to Centralia to endeavor to get employment in the public work that will shortly start here.

Centralia does not take undesirable foreign labor any more than Chehalis, and it is expected that this matter will come up before the Aldermen at the next meeting.

Fresno Yields to Street Speakers

Fresno, Cal.—The controversy over the right to speak on the streets of Fresno has been settled by Mayor Rowell and the City Council ratifying the action of the citizens' committee in granting to members of the Industrial Workers of the World permission to speak on K street and in Chinatown. The compromise provides that the 86 convicted Industrial Workers of the World now serving 40 days in jail for violating the street-speaking ordinance of the city shall be paroled, and the 30 unconvicted prisoners charged with the same offense shall be released immediately. The speaking will be governed by the permit system, the police to be instructed to grant permits to the Industrial Workers of the World to hold meetings on K street next to the Court House Park, and on Tulare street, in the Oriental quarter.

Petitions Urging Municipal Band Circulated

Pasadena, Cal.—Special effort is being made to secure 500 signatures on the petition asking the City Council to put up to the people at the next city election an ordinance establishing a municipal band at a cost of \$32,000 or less per year.

Smoke Ordinance Arouses Interest

Youngstown, O.—There has been perhaps no local legislation of recent years that has caused such general interest as the proposed smoke ordinance now in the hands of a committee of Council. This ordinance, which aims to make Youngstown a smokeless city, will demand a departure in established methods of installing fire grates and firing boilers, since all stacks in the city which emit a dense smoke, with the exception of dwelling chimneys, will come under the ban, and means must be provided for eliminating this nuisance. A violation of the ordinance is liable to a fine of not less than \$10 or more than \$50 for the first offense and a fine of not less than \$20 or more than \$100 for the second offense. Each day in which any provisions of the ordinance is violated shall constitute a separate and distinct offense.

Quiet Fourth of July for Monroe

Monroe, Mich.—Following the example of Toledo and Detroit, the Common Council has enacted an ordinance prohibiting the sale of giant fire crackers, dynamite canes, toy or blank pistols or anything else containing explosives, the ordinance to take effect in 20 days. For violating the ordinance a fine of not less than \$50 nor more than \$100 or imprisonment up to 90 days in the county jail is fixed.

Improvement Association Asks for Wooden Park Benches

Los Angeles, Cal.—Stone or cement seats for Central Park will be too cold, according to a petition filed by the Federated Improvement Association, which asks that the Council install wooden benches, with perhaps an iron framework, instead of the kind proposed by the Park Commission. The petition has been referred to the supply committee, which has the matter in charge.

Vote to Open Parks for the Public

Hackensack, N. J.—The Improvement Commission has voted to open three new parks, Anderson Park, the Park on the Green and Fairmount Park to the public. The question of cost could not be estimated. Accordingly the resolution was referred back to the committee to investigate and report at a later meeting. The resolution authorized a suitable tablet in Anderson Park to commemorate the donor. This question has been up for consideration before, but previously it has been impossible to obtain a favorable vote.

Hagerstown Plans for Cleaner City

Hagerstown, Md.—That the visit of Mrs. Caroline Bartlett Crane, of Milwaukee, to this city some time ago is about to bear fruit in the way of a vigorous campaign to improve the material and moral welfare of Hagerstown is evidenced by a call issued for a meeting of the Hagerstown Civic League. The invitation is extended to all citizens who are interested in promoting the sanitary, aesthetic and educational condition of the city. It is proposed to start at once the practical work of the league according to methods outlined by Mrs. Crane, who is an expert in "civic housecleaning." It is expected that hundreds of citizens will become members of the league.

Pittsburg to Have Free Bridges

Pittsburg, Pa.—Pittsburg is to have free bridges. Within ten days there is likelihood that one may travel to the Northside and back again without having to pay for the privilege. That is the construction placed by all concerned on the decision of Secretary of War Dickinson that the bridges need not be raised. Whether or not the bridges must be raised in the future—and the river interests have not given up the fight—is beside the question. The decision of the Secretary has made action possible and the Board of Commissioners has met and authorized Attorneys Hay and Vail to begin condemnation proceedings. The attorneys have all the papers prepared. They have asked the court for the appointment of viewers. And from that time on the County Commissioners are convinced things will proceed with neatness and dispatch. And the decision of Secretary Dickinson means the paving the way not for the freeing of three or four bridges, but for all five over the Allegheny in the city limits—five bridges capitalized at \$1,820,000, divided as follows: Sixth Street Bridge, \$625,000; Seventh Street Bridge, \$750,000; Ninth Street Bridge, \$150,000; Sixteenth Street Bridge, \$95,000; Thirtieth Street Bridge, \$200,000.

That they have been and are money makers is evidenced by the fact that the Sixth Street Bridge pays annual dividends of 15 per cent on par value of \$25 a share; the Seventh Street Bridge, 6 per cent on par value of \$50 a share; Ninth Street Bridge, between 11 and 14 per cent on \$50 par value; Sixteenth Street Bridge, 20 per cent on \$50 par value, and Thirtieth Street, 6 per cent on par value of \$50. The bridges are owned by 645 stockholders, a large percentage being estates. The Sixth Street Bridge has 327 stockholders, holding 24,411 shares of stock, more than 17,000 of these being held by women and children and trust estates. The Ninth Street Bridge has 93 stockholders, including 37 estates. There are 100 stockholders in the Seventh Street Bridge, 100 in the Sixteenth and 25 in the Thirtieth Street Bridge.

Municipal Shows Meeting with Success

Hartford, Conn.—The municipal exposition under the auspices of the joint committee of the Municipal Art Society and the Civic Club is meeting with popular favor. The different departments of the city government have been industriously engaged for several weeks in preparing their exhibits. The general public will find a lot of information at this exhibition about the city government that it did not possess before. The plans of Carrere & Hastings for the development and beautification of the city, which will be forwarded from New York this week, will be displayed.

Toledo, O.—Toledo's first municipal show is giving citizens the opportunity to inspect the work of all the various departments. The hall is open each afternoon with moving pictures and a musical program each evening as added attractions. There is no admission charge. For the purpose of giving many persons the unusual opportunity to see the legislative branch of the city government in actual operation, the session of council will be transferred one night to the stage of Memorial Hall.

To Popularize Central Park

New York, N. Y.—The question of the popularization of Central Park, which raised much opposition last year, was taken up by the Aldermen last week, and a resolution passed requesting Park Commissioner Stover to proceed at once with the construction of the playground, wading pool, etc., in the northern end of the park authorized in the budget for this year.

LEGAL NEWS

A Summary and Notes of Recent Decisions—Rulings of Interest to Municipalities

Illegal Removal of Fire Chief

Leonard vs. City of Terre Haute.—Under the express provisions of Burns' Annotated Statutes 1908, the chief of the fire department is an appointee of the board of public safety whom the board cannot remove for political reasons, nor in any other manner than as therein provided. When a de facto officer is in the possession of an office and discharging his duties under color of right, a person claiming to be de jure entitled to the same office cannot sue for the salary or fees of the office without first establishing his right to the office by quo warranto, as otherwise it would permit him to try the title to an office in a collateral proceeding to which the holder of the office under color of right was not a party. Where a statute makes provision for the chief of fire force and firemen, their appointment, mode of compensation and proceedings for removal, their duties are of a public nature, and so far official that one holding a position either as chief or fireman is entitled to his salary as an incident to the position, whether he performs the duties of such position or not. Acts done under coercion cannot be held to be an abandonment of office. Appellate Court of Indiana, 93 N. E. R., 872.

Legislative Control—Municipal Property

Board of Handley Trustees vs. Winchester Memorial Hospital et al.—Acts 1895-96, entitled "An act to enable the city of Winchester to accept the bequest of John Handley," etc., provided for a board of trustees to carry out the objects and the benefactions, instead of the Common Council, and provided that the trustees should superintend and direct the investment of the fund, etc., but that no plan for the ultimate application of the fund should be valid unless approved by the Common Council. Held, that the act deprived the Common Council of all power to charge the fund for services rendered by an attorney in litigation which arose concerning it. Supreme Court of Appeals of Virginia, 70 S. E. R., 133.

Paving Assessment—Review

City of Decatur vs. Brock.—Questions relating to certain clauses of a paving contract and the extension of time for the completion of the work are not questions of record or jurisdiction to be reviewed by a common-law certiorari to review an assessment therefor, especially in view of Laws 1907, giving a right of appeal. Supreme Court of Alabama, 54 S. R., 209.

Vacation of Streets—Evidence

Gatle vs. City of Cedar Rapids.—The court in determining whether there should be a vacation of streets in proceedings under Code, authorizing the vacation of plats and streets and alleys thereon, must consider reasonable future requirements, and the fact that the streets are considered necessary for use by the city for water and sewer pipes shows that they will also be needed for use by the general public, and they should not be vacated. Supreme Court of Iowa, 129 V. W. R., 737.

Paving Assessment—City Park

Newberry vs. City of Detroit.—Under Detroit City Charter, providing that for the purpose of an assessment for paving a street the lots and parcels of real estate situate on the street and fronting the portion improved constitute one local assessment district, and the assessment thereof shall be according to their frontage, a park owned by the city and fronting thereon is not exempt from assessment. Supreme Court of Michigan, 129 N. W. R., 699.

Defects in Streets—Lighting

Blain vs. Town of Montezuma.—Under Code, giving to cities and towns the power, but not expressly imposing on them the duty, to light their streets, no absolute obligation is imposed, either as to the extent or mode of lighting, and the inefficiency of a system of lighting installed does not constitute negligence. Supreme Court of Iowa, 129 V. W. R., 808.

Dangerous Trees—Question for Jury

Wright vs. City of Chelsea.—Where a shade tree in a city street has plainly, for over a year, been in a condition making it a menace to the public and the defect can only be remedied by removal of the tree, and not by trimming it, and the officer charged with care of the streets takes no steps to report the defect to the proper authorities, looking to its removal, as required by Revised Laws, section 10, nor to warn the public of the danger, the city is liable for injuries to a traveler by the fall of a limb. Whether a tree was dangerous because of decay and liability to fall, and whether a city has used due care to protect the public, as required by Revised Laws, providing for the removal of such trees, are jury questions, in an action against the city for injuries received by the falling of such tree. Supreme Judicial Court of Massachusetts, 93 N. E. R., 840.

Street Commissioner—Term of Office

Otto vs. City of Detroit et al.—Under Completed Laws 1897, providing that all appointive officers shall hold until the second Monday in April after their appointment and until their successors are qualified, unless a different term be prescribed, and that officers appointed to fill vacancies shall hold until the next annual election and until their successors are elected and qualified, one appointed village street commissioner would hold the office de jure until his successor qualified and entered upon his official duties, so that the invalidity of a subsequent reappointment of such appointee could not prevent him from recovering his salary for the time he held the office until such successor qualified and entered upon his duties. Supreme Court of Michigan, 129 N. W. R., 731.

Attorneys—Compensation

Moore et al. vs. City of Detroit et al.—Where the president of a village made a contract for the services of attorneys, the agreement covering also a retainer, which contract was beyond his power, and the village by resolution of the Council subsequently appointed the attorneys to the position of attorneys for the village, but provided for no specified compensation, the attorneys were entitled only to reasonable compensation for services actually rendered, and hence, in an action by the attorneys for compensation, the jury should have been charged that no retainer could be recovered. Where the value of an attorney's services, outside those covered by the retainer, which he was not entitled to recover, as testified to by the plaintiff, was something over \$2,000, and the difference between this sum and the amount of the judgment was practically the amount of the retainer during the period of employment, there can be no doubt that in making up their verdict the jury allowed the plaintiffs a sum equivalent to the retainer, so that failure to charge that plaintiff could not recover for the retainer was prejudicial. Supreme Court of Michigan, 129 N. W. R., 715.

Contracts—Use of Public Money

McManus et al. vs. City of Petoskey et al.—A provision of a lease by a city of its land that the city shall deposit with a third person a sum of money belonging to the city, to be paid over to the lessee when a new building to be erected by the lessee for manufacturing purposes is completed, and which fixes the interest of the city in the building, is invalid as an attempt to use public money for the furtherance of a private enterprise. Supreme Court of Michigan, 129 N. W. R., 681.

Suspension of Employee—Compensation

Hoyt vs. City of New Rochelle.—The voluntary reinstatement, after a suspension of 13 or 14 months, of a sewer inspector appointed under the civil service laws, without proceedings by him to secure reinstatement, do not establish a wrongful discharge in the first instance, and do not entitle him to compensation for the period during which he was suspended. The suspension by the Board of Public Works of a city of a sewer inspector, appointed under the civil service laws, because of lack of work and lack of funds, the inspector being put back in his position as soon as there was work for him to do and money with which to pay him, was not a wrongful act and showed no bad faith on the part of the board. New York Supreme Court, 127 N. Y. S., 223.

Use of Streets—Automobile Races—Accident Liability

Bogart vs. City of New York.—A City Council has no power to authorize the use of public streets by an automobile club for automobile races to be held within certain hours on a particular day, and such use of the street is illegal. Where a spectator was voluntarily present to witness automobile races on a public highway, illegally authorized by the City Council, his administrator could not recover against the city for his death, resulting from being struck by an automobile swerving in its course and leaving the highway, on the theory that the contest was illegal in the absence of proof of negligence. Court of Appeals of New York, 93 V. E. R., 937.

Incorporating of Cities—Statutes

Kuhn, Atty.-Gen. vs. Common Council of City of Detroit.—Under Constitution Annotation, 1908, providing that under general laws the electors of each city may frame, adopt, and amend its charter, and Public Acts No. 279, providing for the incorporation of cities and authorizing, in section 21, amendments proposed by the legislative body or by initiatory petition, a revision of an existing charter of a city as authorized by the act of 1909 must precede proceedings to amend the charter in the manner prescribed in the act. Supreme Court of Michigan, 129 V. W. R., 879.

Defective Sidewalk—Contributory Negligence

Stodd et al. vs. City of Philadelphia.—The parents of a boy 4½ years old of ordinary intelligence who lived in a large city, are not chargeable with negligence as matter of law for permitting the child to play on the sidewalk without an attendant, although having knowledge of a defect in the walk likely to cause a child passing over it to fall, but, in an action for an injury to the child from such defect causing his death, the question of contributory negligence of the parents is one for the jury. United States Circuit Court, 183 F. R., 659.

Street Widening—Removal of Buildings

Wheeler vs. City of Sault Ste. Marie.—A city contracting to buy land to widen a street could not undertake with the owner to move his building, make a fill on land retained by him, re-establish fences, etc., nor to indemnify him against risks in moving the building as to persons and property. A city has only such powers as are given it by the Legislature. In acquiring land to widen a street, a city is limited by the modes prescribed by statute and its charter. A city cannot indemnify risks for individuals or other corporations. Supreme Court of Michigan, 129 N. W. R., 685.

Contracts—Fraud—Interest of Officer

Mayor, etc., of City of Ensley vs. J. E. Hollingsworth & Co.—Where in an action on a contract for the construction of sanitary sewers for a city it appeared that the contractor was a firm, a partner of which was a member of the City Council at the time of the execution of the contract, evidence of other bids on the same work was relevant on the issue of fraud in procuring the contract. Where in an action on a contract for the construction of sanitary sewers for a city a plea averred that plaintiff's bid had been fraudulently changed from a bid of 40 cents per wye to \$1.40 per wye after the making of the contract, the testimony of a bidder that his bid of 80 cents per wye was the highest bid, was admissible to show that plaintiff's bid had been changed. A contract by a City Council with a firm, a partner of which is a member of the Council, for public work is not invalid, in the absence of a statute, where it is free from fraud, and where the partner did not vote on the proposition nor take any part in behalf of the city in making the contract. Code 1907, providing that no alderman or officer of a municipality shall be directly or indirectly interested in any work, the expense of which is paid from the treasury, does not apply to a contract made before the adoption of the statute. Supreme Court of Alabama, 54 S. R., 95.

Ordinance—Two Subjects—Review

Lonsinger et al. vs. Ponca City.—Where it is not apparent that the title of an ordinance contains two subjects and the same is not pointed out, the ruling of the trial court upholding the validity of the ordinance will not be disturbed in this court. Supreme Court of Oklahoma, 112 P. R., 1006.

Injuries to Servants of Independent Contractor

Huey et al. vs. City of Atlanta.—The operation of a system of water works is not such a governmental function as that a city is not liable for injuries resulting through negligence in the maintenance thereof. While this business is quasi public, it is not essentially governmental. If the proprietor of premises on which machinery is located employs an independent contractor to repair a particular machine, and the proprietor knows, or by the exercise of ordinary care should know, not only that the machine is out of repair, but that there is some extraordinary latent danger or perilous condition attaching upon the service, and the independent contractor sends a servant to make the repairs (the servant being actually or constructively ignorant of the extraordinary danger), it is the duty of the proprietor of the premises to warn the servant thereof; and for a breach of this duty, resulting in injury to the servant, the latter has a cause of action against the proprietor of the premises. Court of Appeals of Georgia, 70 S. E. R., 71.

Village Election—Insufficient Notice

In re Village of Lynbrook.—A notice of an election on the question of the incorporation of a village, which provides that the election shall be held on a designated date between the hours of 1 o'clock in the afternoon and sunset, is insufficient under Village Law, as amended by Laws 1910, requiring that the polls shall be open from 1 o'clock in the afternoon until 8 in the evening, where on the designated date the sun set 29 minutes after 7, and the election must be set aside, though the notice need not specify the hours during which the polls shall remain open, but, where it purports to do so, it must comply with the statute. The act of the town clerk of a town in leaving on the counters of tradesmen notices of election on the question of the incorporation of a village and in hanging up one notice in a shop is not a compliance with Village Law (Consol. Laws, c. 64), section 10, as amended by Laws 1910, providing that the notice shall be posted in conspicuous places. New York Supreme Court.

Licenses—Exemptions—Charitable Societies

City of Mobile vs. Kiernan.—An indorsement on the back of a petition to the Mobile City Council for exemption from payment of a license fee and for the return of the amount paid, "We will vote to grant this petition," signed by nine members of the Council, was of no legal effect; the legislative authority of the city being vested in the Council as an organized body, whose will could be expressed only as prescribed by law, the members acting severally being able to do nothing. Mobile City Charter empowers the City Council to collect a license tax from all persons or corporations trading or carrying on any business, trade or profession, by an agent or otherwise, within the corporate limits. A charitable society contracted with an amusement company to hold a street fair in the city, the society to furnish the license and to receive a percentage of the receipts. The amusement company was a purely business concern. Held, that the business was subject to a license as well as any other, even if charitable enterprises were exempt. Supreme Court of Alabama, 54 S. R., 103.

Control of Streets—Railroads

City of Memphis et al. vs. St. Louis & S. F. R. Co.—Under the provisions of the charter of the city of Memphis giving it entire control over all the city streets and power "to permit and regulate the laying off of railroad tracks and iron and the passage of railroad cars," vesting in the City Council charge and control of the granting of all franchises and special privileges, and providing that "no franchise shall be granted or sold to any commercial railroad . . . or other quasi-public corporation except by ordinance fully guarding and protecting the rights of the public," in the absence of direct legislative authority, a railroad company has no right or authority to build or maintain a track within the city and over its streets without the consent of the Council, and where the Council has granted such right by an ordinance, subject to certain conditions, one of which is that the company shall file a written acceptance of its provisions, such ordinance is an entirety, and its acceptance is a condition precedent to the grant. United States Circuit Court of Appeals, 183 F. R., 529.

TANKS AND STREET KETTLES

NEED OF STORAGE CAPACITY

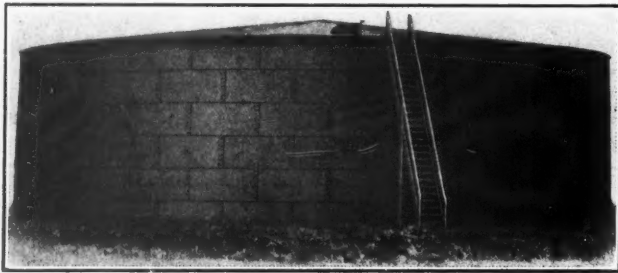
The remarkable increase in the amount of bituminous road construction brings to the front the question of ways and means of handling the bitumen. In the discussions of road making the value of asphalt and tars depending on their physical and chemical constitution is argued ad infinitum, but possible economies through the choice of the best means for handling the bituminous materials are generally overlooked. Ordinary construction tools and machinery play a subordinate part in the new method of road making and an unfamiliar class of appliances are of the greatest importance—namely, tanks. That the supply of this

tank cars and kept standing, under a demurrage charge to the owner of the tank. If the amount of work under control is large and likely to be duplicated in succeeding years, as in the case of a well established local contractor or a municipality doing its own work, the use of one or more storage tanks will be found to pay. In addition to security of supply, if the tank is properly placed there is considerable economy effected in handling from the car in which the material arrives to the tank wagon or whatever device is used to deliver it on the work.

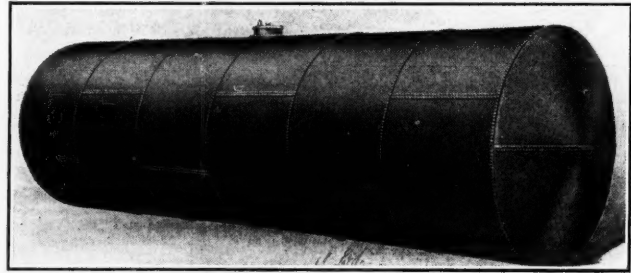
GENERAL CONSIDERATIONS

In choosing storage tanks the shape and number of tanks has to be consid-

though a light oil or tar is used, heating will facilitate the work in cold weather, permitting construction to go on under conditions otherwise impossible. A drip to draw off water should be provided. The amount of water that condenses in such a tank is surprisingly large, and if the material is to be heated up to 212° F. the trouble with foaming may be such as to stop the work. Of course if the bitumen is handled at a lower temperature than 212° F., the water will do no harm. But in a permanent installation both contingencies should be provided for. The choice of a valve for drawing off has to be considered. Gate valves are objectionable, as they may stick, and a workman in



LARGE STORAGE TANK MADE BY THE PETROLEUM IRON WORKS CO.



6,000 TO 12,000-GALLON STORAGE TANK, MADE BY WARREN CITY TANK AND BOILER CO.

sort of equipment has not kept pace with the demand is the evidence of contractors who have had work to do, particularly in places far from the great cities.

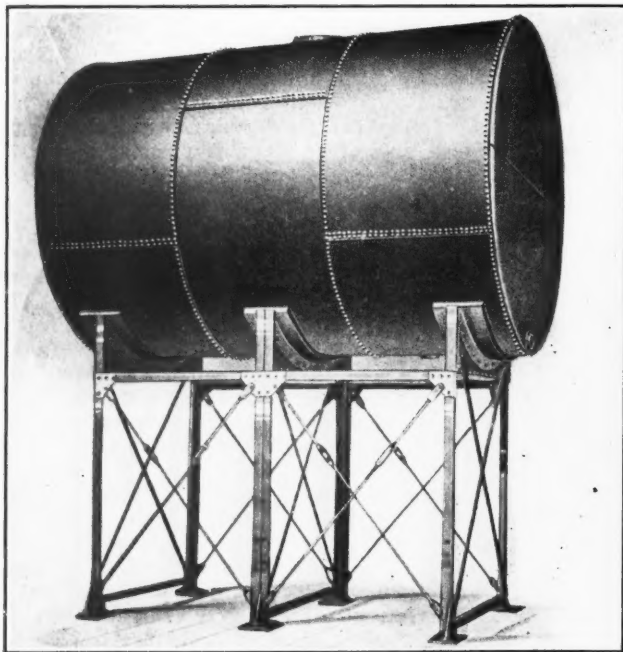
Of course if details are gone into fine enough no two jobs are alike or require the same equipment. There are few pieces of bituminous road work, however, that can be carried on without some provision for storage. Lack of storage means idle men and needless expense or the disintegration perhaps of a well organized force of men when the supply gives out. The need of storage may be supplied by keeping barrelled material on hand on vacant lots along the line of the work. Or the tar or asphalt may be purchased in

ered. The shape will depend on the location, the difference in level between receiving and shipping points, as well as considerations of cost of the different styles. Whether one tank is sufficient is another question to be decided. For an equal storage capacity, one tank is the cheapest. But if two or more tanks are set up, different kinds of material, as tar and asphalt, may be handled at the same time. As to the size of storage tank, considerably more than the capacity of one railroad tank car, about 7,000 gallons, should be provided. Ten thousand gallons is the least capacity worth considering, and where anything like continuous work is in sight twenty thousand gallons is not any too much, even for a town of moderate size.

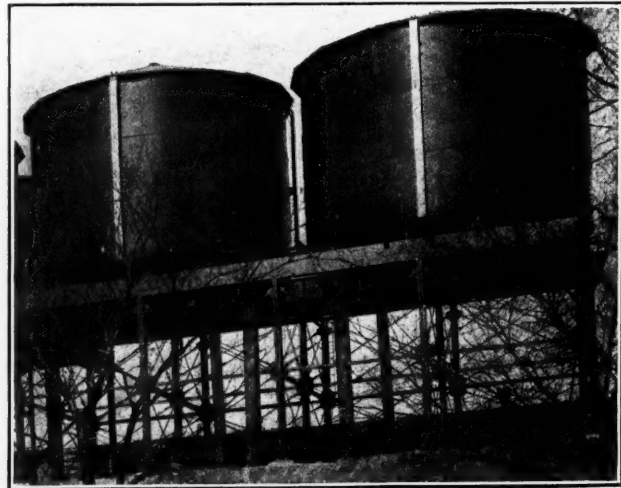
Among the important accessories of a storage tank are steam coils, for even

his hurry may twist off the stem. A common plug valve is cheaper and better.

Probably the first inclination of a contractor or city official who has decided to buy a storage tank for road oil is to direct inquiries to the nearest boiler maker. This, however, is not likely to be the best thing to do. Tank making is not ordinary boiler making. Tanks are made of quarter-inch steel, or about that thickness, furnished in large plates, five feet wide and from six to nine feet long. The large sheets, besides making a better tank, avoiding chance of leakage, are more desirable economically, as requiring less riveting. A tank maker may have the sort of tank that is required on hand, at any rate he is in a position to make it promptly. The prospective purchaser might think that the item of freight would prohibit any but the nearest tankmaker from being a successful bidder, but such is not necessarily the case. Manufacturers frequently supply tanks to points hun-



ELEVATED STORAGE TANK, 6,000 TO 12,000 GALLONS, MADE BY WARREN CITY TANK AND BOILER CO.



STORAGE TANKS ELEVATED ABOVE RAILROAD, MADE BY CANTON BOILER AND ENGINEERING COMPANY

dreds of miles distant from their plants.

The accompanying illustrations show a variety of storage tanks built by companies to whom the *Municipal Journal* has directed inquiries. Most of the manufacturers state that they build tanks to meet the requirements and under the specifications of the purchaser. The Warren City Tank & Boiler Company, however, state that they keep on hand at all times cylindrical tanks of from 6,000 to 12,000 gallons capacity. Some of these are already equipped with heating coils of proper design. Among the companies that state that they are ready to supply at short notice tanks of from five barrels to 65,000 barrels capacity are the Petroleum Iron Works Company, the Treadwell Construction Company, the Canton Boiler and Engineering Company and William Graver Tank Works.

A peculiar system of storing and handling road bitumens has been developed by S. F. Bowser & Co. A heavy steel tank is buried underground located so that it can be filled immediately by gravity from the tank car—a quick and cheap method. A Bowser rotary pump is recommended for drawing the liquid from the storage tank into wagons or kettles which are to carry it to the work. The pump need not be installed close to the tank. This system is in use in Milwaukee.

TANK WAGON

From the storage tank, in the ordinary routine of work, the bituminous material is transferred to smaller tanks which serve as heaters, as means of transportation and as distributors or for all these purposes to a varying extent. A tank made by the Barrett Manufacturing Company, of which a reproduction and diagram are shown, answers all these purposes very well when it is convenient to handle so much material at one time. Its capacity is 600 gallons. This outfit consists of an ordinary but very substantial running gear carrying on semi-elliptical springs, a framework, suitably braced, of which the principal parts are two 6-inch I-beams, 10 feet $7\frac{1}{2}$ inches long reinforced with a wooden filler. As the whole equipment with load weighs nearly 9,000 pounds the heavy springs and frame are essential to durability. The tank is 9 feet long and 42 inches in diameter. It sets up above the I-beams, being supported by four brackets on each side, riveted to the tank. There is a firebox under the tank at the rear and a flue running the whole length and a stack at the front side of the driver's seat to give proper draft. As the tar is delivered into the tank hot only a small fire is necessary and the direct exposure of the tank to the heat does no harm. The firebox is of cast iron, 23 inches deep and 20 inches wide. The pipe for drawing off is placed as near the bottom of the tank as possible. On top of the tank is a manhole for use during cleaning, a plug and flange at the opening

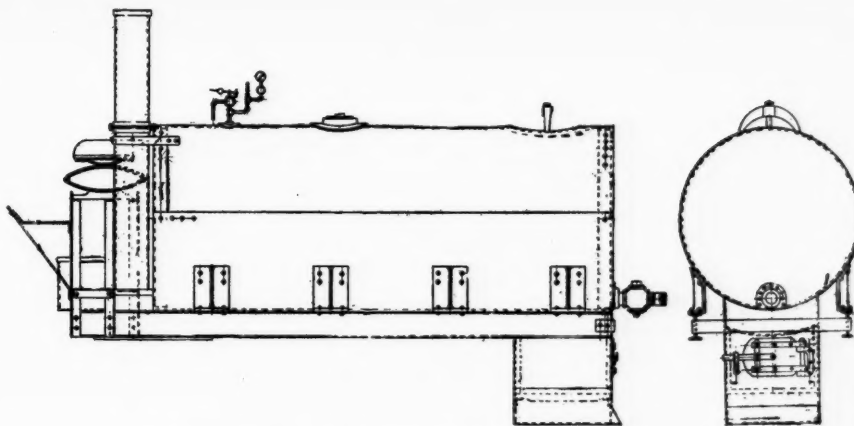


DIAGRAM BARRETT MFG. CO.'S TANK WAGON, WITH FURNACE

where the tank is filled, a pressure gauge, a blow-off valve and connections for compressed air or steam.

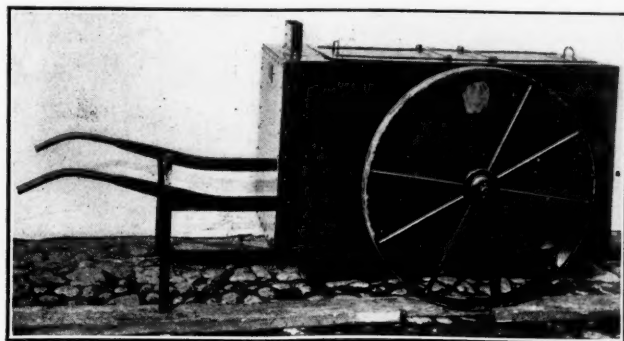
The reproduction shows a side view of the tank wagon which is being drawn by a road roller spreading heavy tar via with special spray nozzles, using air pressure. A galvanized iron hood, to protect the spray from wind, covers the nozzles. This arrangement spreads a strip about 7 feet wide. The quantity used per square yard is regulated largely by the speed of the roller.

The distinction between this Barrett tar wagon and an ordinary watering cart used for transporting and distributing oil is perhaps rather a fine one. For if the tank of the watering cart is of steel and strong enough to stand a pressure of 20 pounds to the square inch the function performed may be the same. In fact, the Barrett wagon is frequently used in this way without any fire and the wagons are also built without the fire box. But as this article is confined to the consideration of storage tanks and kettles, tank wagons, having no means of heating attached, will not be further considered.

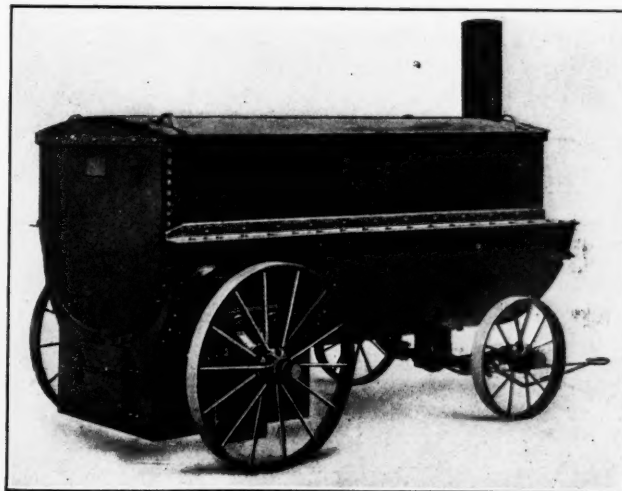
CAPACITY AND SHAPES OF STREET KETTLES

Before taking up the different types of street kettles, in the more restricted meaning of appliances for heating and aiding in the distribution of tar and asphalt, some general considerations should be borne in mind. First, there is the question of capacity—this means both quantity contained and amount that can be heated, depending on the efficiency of the firing arrangements—grate area and area of surface exposed to the heat. In making quick estimates of capacity certain units easily kept in mind are sufficiently accurate for rough estimates. The amount of bituminous material needed is best figured in fractions of a gallon per square yard

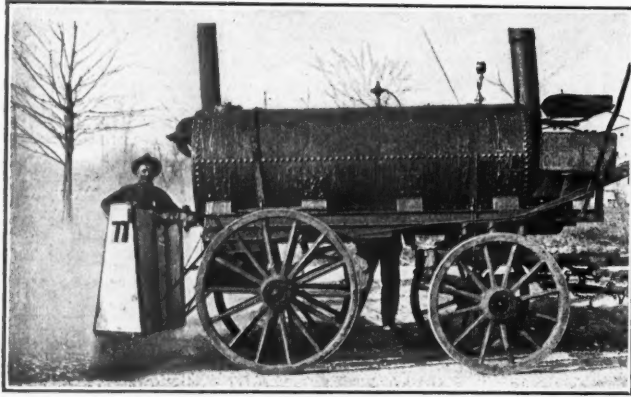
of work. In figuring the capacity of the tank a barrel, assumed to measure fifty gallons, is the ordinary unit. One-barrel tanks are the smallest used and ten-barrel tanks the largest. How many times a tank may be heated up in a day is hard to say, as skill in handling and the nature of the materials vary so much. Three hours allowed for the first tank in the morning and two hours for the succeeding tanks would be fair work. The first tank should be fired up by the watchman and ready for use when the men come to work. About five tanks a day should accordingly be heated. Referring to our units then, with a ten-barrel tank on work requiring half a gallon to the square yard, 1,000 square yards of roadway should be covered for each tank used. The matter of the durability of the tank is an important one. In this connection, it is interesting to note the great improvement made in street kettles in recent years. The weak points of all kettles are the running gear, including the handles or device by which it is drawn, including the joint to the axle, and the bottom of the kettle which is exposed to the heat. Old style kettles were rectangular, drawn on four wheels with frame and kettle proper riveted in one structure. The wheels were small and wore out at the axles. The handle and hooks were continually breaking and the bottom when it burned out was expensive to replace. After one or two years' time extensive repairs were necessary. In the kettles illustrated, these defects have been to a large extent overcome. In small kettles two large wheels are now used. This not only decreases the wear on the axles and hubs, but decreases the strain on the handle and hooks during transportation. In the case of



F. H. EVANS' RECTANGULAR STREET KETTLE



JOS. HONHORST'S 500-GALLON STREET KETTLE



BARRETT MFG. CO.'S TAR WAGON IN OPERATION

four-wheeled kettles larger wheels than formerly are used and a substantial fifth wheel added. To decrease the danger of burning out the bottom of the kettle, the pot, is made detachable so that it can be taken out, heated over a fire or burned out with the aid of kerosene. In one of the kettles described a cast iron bottom is used, and in all cases the material chosen for the melting pot is carefully selected.

CARE OF KETTLES

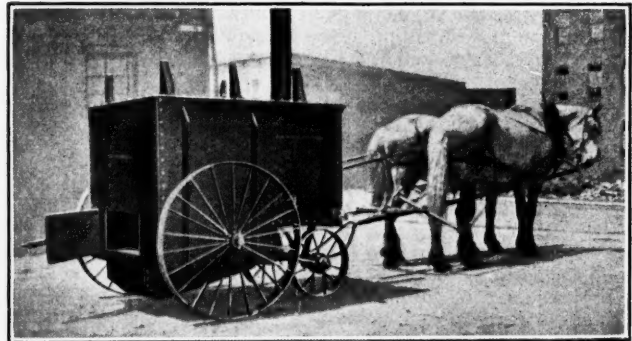
A few words regarding the care of kettles with a view to prevent burning out. The destructive influences at work on the bottom of the kettle are the same as those which tend to destroy a steam boiler, and the remedy is the same, namely, keep the metal clean. To keep it absolutely clean is hardly possible, to keep it practically clean only requires due attention and the use of proper tools. All tars and most asphalts contain dirt and carbon which settle to the bottom and form coke. Besides, street dust blows in and adds to the sediment. Coke even to a considerable depth may accumulate in the kettle, unsuspected by a superintendent not thoroughly familiar with the peculiarities of tar kettles. The scale cannot be detected by ordinary sounding with a bar. Even if the tank is emptied and observed it is not easy to distinguish between the coke and the steel bottom. Use of a cold chisel and a hammer will disclose the facts. For cleaning kettles a chisel-faced tool two or three inches wide with a handle about two and a half feet long is very useful. The kettle should be cleaned daily with such a tool, and once or twice a week, according to the nature of the materials used, it should be removed from the frame and completely burned out and

gone over with a chisel and hammer if necessary. The saving in fuel will pay the cost of cleaning, to say nothing of the life of the kettle, which could be prolonged indefinitely if kept absolutely clean.

LARGE STREET KETTLES

The largest portable kettles made are of 10-barrel or 500-gallon capacity. We illustrate two of these, both of which answer the same purpose, but vary in construction and design. The Jas. Honhorst Co.'s four-wheeled tar wagon is constructed of $\frac{1}{4}$ -inch steel plate throughout. The firebox is large in size, made to burn coal or wood and is provided with heavy cast iron grate bars and heavy inside lining of $\frac{3}{8}$ -inch steel plate. The front end of firebox extension has double doors hinged on so that the space between kettle bottom and inside can be thoroughly cleaned from end to end. The rear end has large size fire door hinged on with full length strap hinges and latch. The smoke stack is fitted over nozzle, riveted to top of firebox projection at front. The shell of firebox extends semicircular up around the sides of kettle, thus making a quick and easy heater. The kettle is semicylindrical in shape with end heads flanged and riveted in and is stiffened on each side full length, with $2\frac{1}{2}$ -inch angle iron, also around the top with $1\frac{1}{2}$ -inch angle and cross-stayed with two $\frac{1}{2}$ -inch rods passing through pipe. The kettle is bolted to firebox at side angles and the front end has a 2-inch flange with nipple and draw-off cock. The rear axles are of heavy cast-iron bracket type, with larger taper machine steel spindles cast in by having the casting poured around same, in mold. These are securely bolted to sides of firebox through the outside shell and the inside $\frac{3}{8}$ -inch lining. The front

axle is a $2\frac{1}{4}$ -inch square steel forging with eye at center and a steel pin passing through fifth wheel, which is so constructed that the weight on same is distributed between the shell of firebox and the bottom of kettle. The wheels are 24-inch and 42-inch diameter, all-steel, with extra long hubs, bored to suit taper of axles, staggered wrought spokes and welded rims with extra steel tire shrunk over outside and riveted. This outfit is furnished complete with a cover made of



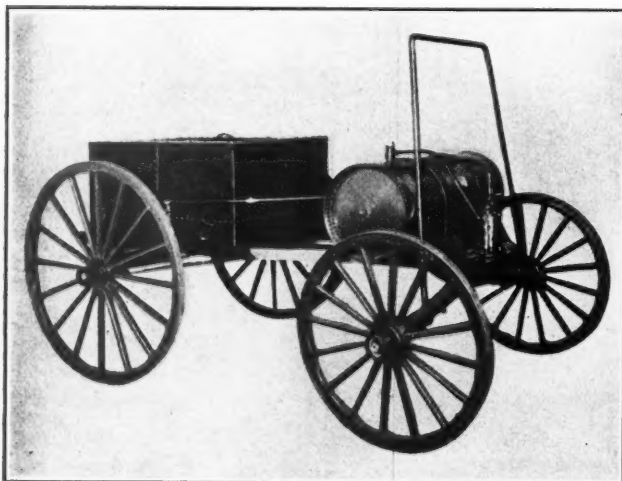
TIDEWATER IRON WORKS 500-GALLON STREET KETTLE

sheet steel, arched and reinforced underneath and edges projecting over sides and ends. Each part of cover has two handles. The front axle has a yoke or tongue attached to clips and with turned eye in middle for coupling to rear of supply or tool wagon.

The other kettle of the same class is made by the Tidewater Iron Works, whose officers have been closely associated with the paving business for many years, with the result that their designs embody many ideas of practical men. The kettle is so made that horses can be quickly attached to it. Racks for carrying wood, which have been built on top, are a great convenience, providing means for overcoming the difficulty of keeping material hot on long hauls. The boiler can be replaced without sending whole kettle to shop for repairs. Both running gear and kettle are substantially constructed throughout.

The Tide Water Iron Works also makes a combination tar kettle and gravel heater which might be useful in road work as well as for repairs to granite paving, for which it was built. One fire furnishes both hot tar and gravel. Over the firebox in front of the kettle proper is a structure made of perforated iron plates, showing in cross-section like an inverted V. Baffle plates arranged outside of this form pockets for the gravel or broken stone. These baffle plates, however, are not brought close to the perforated plates, but an opening is left so that the gravel, thrown in cold at the top, is taken heated from the bottom. The whole apparatus is mounted on two large wheels and can be drawn about easily.

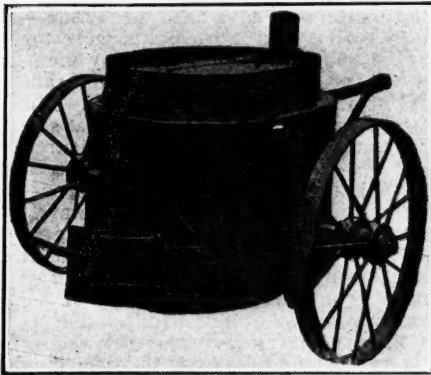
A peculiarly constructed kettle is made by Walter Macleod & Company. The tar is heated by means of oil burners placed



WALTER MACLEOD COMPANY'S OIL-HEATED STREET KETTLE



SMALL ELLIPTICAL KETTLE, TIDE WATER IRON WORKS

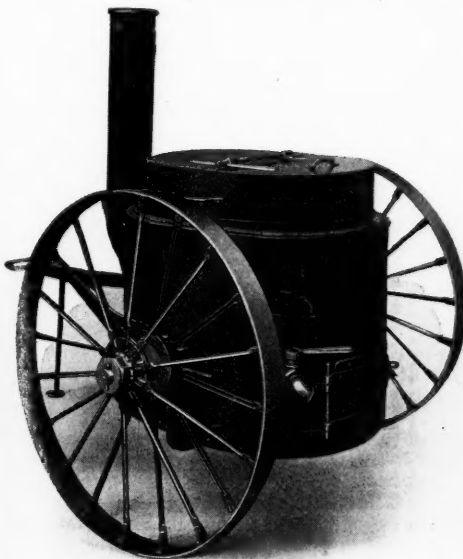


CONNERY & CO.'S SMALL ELLIPTICAL KETTLE

under a tank. The capacity of these machines varies from 50 to 200 gallons. An oil tank is carried in front of the wagon. Air pressure supplied by a hand pump feeds the fuel to the burners. The ordinary consumption of kerosene is stated to be two or three gallons per hour. The device is claimed to eliminate the smoke nuisance which often makes street kettles so offensive. However, the nuisance of a tar or asphalt kettle is caused almost wholly by the practice of burning the staves of the barrels in which the material comes. This is easily avoided by not burning the staves. When fuel costs money and barrel staves are to be had for nothing, it is hardly in human nature not to use them. With the oil-burning kettle they cannot be used.

SMALL KETTLES

In connection with road construction where thousands of gallons, perhaps, are used daily, it would seem at first sight that small kettles of one or two barrels capacity would be of no use. Wherever there is new work there are always repairs to follow, and even in new construction there are small sections to do, as at intersections. For this reason there seems to be no doubt that small kettles will find an extensive use. The cost of transportation and the deterioration of material when heated for a long time make large kettles undesirable for doing small pieces of work. The type of kettles that have been developed in connection with asphalt paving repair work will probably best answer the purpose, as they have been built to meet the conditions. The small kettles herewith de-



IROQUOIS IRON WORKS' SMALL ELLIPTICAL KETTLE

scribed will, therefore, interest those who have the construction and maintenance of bituminous roads under their charge.

The Iroquois Iron Works makes a rectangular heating kettle of one, two or three barrel capacity, equipped with two steel wheels 48 inches in diameter, with 4-inch rim and wrought-steel spokes. The wheels are mounted on a heavy steel axle fastened securely to the bottom of the kettle. The furnace is provided with sheet-steel bottom, No. 12 gauge. A tongue is riveted to the tanks at the proper height for hauling the kettle, and a wrought-iron rest with a foot is provided. The most frequently encountered difficulty in working with kettles, namely, clogging of the faucet by cold material, has been overcome by placing the faucet inside the kettle. This is shown in the cut. The three sizes of kettles weigh 650, 750 and 910 pounds, respectively.

Iroquois asphalt and tar kettles are also made elliptical in form, of $\frac{3}{4}$ -inch tank steel, riveted to heavy angles at the top and bottom and are made in 100-gallon capacity. General dimensions: Length, 44 inches; width, 33 inches; depth, 30 inches. Fire door of sheet steel is located at rear near bottom, and is equipped with heavy wrought-iron hinges, lugs, latch, etc., and has an opening of $13\frac{1}{2}$ by $8\frac{1}{2}$ inches. A cast-iron elbow is riveted to kettle on front end at top, to which is attached the smoke stack, which is of No. 16 steel, 36 inches in height, with properly designed supports. The kettle is equipped with cast-iron grates. The asphalt tank is made of same material as kettle and is supported by angles, tank dimensions being $27\frac{1}{2}$ inches wide by 38 inches long by 28 inches in depth; bottom is of cast iron having raised center and properly ribbed to prevent warping, and is riveted in. The weight of the elliptical kettle, two-barrel capacity, is 1,420 pounds.

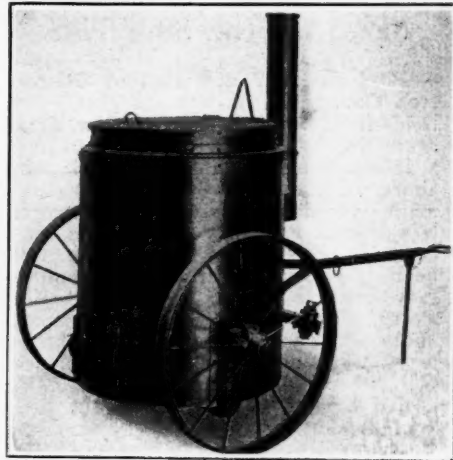
Connery & Company make a 100-gallon wheel kettle which weighs 625 pounds. It is 42 inches high, made of No. 12 firebox steel and has a 2-inch solid crank axle. The sides are reinforced. The wheel track is 5 feet 2 inches wide. Wooden wheels are also furnished if preferred. This company also makes a 150-gallon rectangular kettle with four wheels.

F. H. Evans, who has been manufacturing kettles for roofers for 25 years, makes a portable tar heater shown in the illustration. The angle-iron frames are welded and the sides are double. They are claimed to be very rapid heaters. There is a 2-inch valve to draw off pitch, not shown in the illustration.

The Tide Water Iron Works make a rectangular kettle which they claim is the most substantially built one on the market. It is built of No. 12 steel throughout. The firebox measures 30 by 24 inches. The wheels are 11 inches in diameter and have 3-inch tires. This kettle is made in three sizes, 50, 100 and 150 gallons capacity.

Joseph Honhorst Company makes two styles of elliptical kettles, A and C. The best of these, style C, is shown in the illustration. It is made in 50, 60, 75, 90, 100 and 125-gallon sizes.

The outside shell or firebox is made of one continuous plate of special firebox steel thoroughly riveted and reinforced at bottom and top with angle-iron ring riveted in place. The bottom is covered with heavy sectional cast-iron grate bars, which rest on and are secured to bottom angle bearing bar. The front has a cast-iron smoke elbow connected to shell near top and fitted with full length 6-inch sheet-steel smoke stack. This ar-



JOS. HONHORST'S SMALL ELLIPTICAL KETTLE

angement causes all the heat to travel up and around the kettle before escaping. The back of firebox has a large size plate-iron fire door hinged on with wrought iron strap hinges and fitted with lever latch. The doors on small size kettles are equipped with drip guard over top to prevent contents of kettle splashing into fire. The kettle is made of blue annealed soft tank steel, and has a tapered shape with heavy boiler-plate bottom securely riveted in. All seams and joints are thoroughly riveted and caulked proof against leaks of melted tar. The top edge of kettle is reinforced with heavy angle-iron flange on outside which fits into top of firebox, thus suspending kettle so that heat has full play on all sides and bottom. A 2-inch draw-off flange with nipple and stop cock is fitted to shell of kettle close to bottom, which does away with the old method of dipping out over top of kettle. The kettle has a hinged cover of heavy sheet iron which is provided with bracket rest and handle. The outfit is mounted on a heavy square steel drag-axle which passes under firebox, so that there is no danger of kettle tipping back or upsetting.

The wheels are all-steel design, having welded wrought-steel felloes with 3-inch welded wrought-steel tires shrunk over outside and riveted. The spokes are oval wrought steel, staggered into hubs and swaged and riveted into felloes so that grease, heat and vibration have no destructive effect. Front of kettle has a wrought-iron tongue securely riveted to shell of firebox and provided with large eye at outer end for coupling to rear of tool or supply wagon. This tongue is fitted with improved safety locking tongue rest, which prevents the kettle from moving while in use. The tongue shaft also has a loose link for holding rest while kettle is in motion.



IROQUOIS IRON WORKS' SMALL RECTANGULAR KETTLE

NEWS OF THE SOCIETIES

Good Roads Association of Livingston County, N. Y.—The largest good roads meeting of the year in New York State was that held at Geneseo, March 3, in the Village Building. Frank McGuire, of the State Highway Department, speaking of culverts, said that it was a waste of money to construct concrete culverts where roads have not been improved and that only temporary culverts should be built. C. B. Perry, State Highway Department, spoke of dangerous places in highways. The proper placing of a guard rail where there were ditches concealed by vegetation would have prevented many accidents last year. Mr. Perry made the interesting statement that 90 per cent of the State aid money came from the cities.

Northwestern Cement Products Association.—The seventh annual convention was held at Minneapolis, Feb. 28-March 1. The meetings were well attended and much interest was shown. The address of welcome was made by Wallace G. Nye, secretary of the public affairs committee of the Commercial Club. President H. E. Murphy responded. The following addresses were made: Ernest McCulloch, Chicago, on the subject of stucco finishes. C. M. Powell, assistant engineer Portland Cement Company, on cement tile drain. A. A. Pollard, Minneapolis, on economies in concrete construction. Martin T. Roche, on marketing cement products. Capt. George W. Freeman, United States Engineer, gave an account of the proposed high dam on the Mississippi River between Minneapolis and St. Paul. The dam will have the lock on the Minneapolis side, and power house on the St. Paul side, and will develop about 15,000 horsepower for 228 days a year. The estimated cost is \$800,000. Charles E. Sims, Worthington, Minn., spoke on the manufacture of cement drain tile. James G. Houghton, inspector of buildings, Minneapolis, spoke on reinforced concrete construction. W. E. Martin discussed the question of the proper paint for concrete surfaces.

Congress of Technology.—Among the papers to be presented at the fiftieth anniversary of the granting of the charter to the Massachusetts Institute of Technology will be the following: "Sewage Disposal with Respect to Offensive Odors," by George M. Fuller, M. I. T., '90, hydraulic and sanitary engineer, New York City; "The Massachusetts Institute of Technology's Part in Water Purification and the Present Status of the Science," by George C. Whipple, '89, consulting engineer.

American Institute of Architects.—A committee of the Washington, D. C., Chapter has made a report and recommendations to the Chamber of Commerce regarding the future development of Washington. Besides recommending that the spirit of the Park Commission's plan be carried out in the development of Washington, the committee specifically urges that the Lincoln memorial be placed on the bank of the Potomac River, on the axis of the Capitol and the Monument; that Rock Creek Valley be made a park, and that the banks of the Potomac River be acquired as part of the Appalachian forest reserve provided for in a bill passed by Congress. Steps will be at once taken to enlist the aid of the commercial bodies of the United States in influencing Congress to favor the plan.

Massachusetts Civic Conference.—The Conference held its annual meeting March 2 with sessions at the rooms of the Twentieth Century Club and an evening session in Channing Hall, Unitarian Building, Boston. The time was occupied with discussions of play, physical education and playgrounds. At the evening session Joseph Lee presided. Dr. Edward W. Stitt, district superintendent of public schools of New York City, spoke on the use of the public school buildings as recreation centers, saying: "Hitherto not enough use has been made of the public school buildings. In most cities they are used only about 1000 hours a year. This amount must be increased at least 200 per cent."

Dr. Stitt urged as the objects:

To keep children and young people from street dangers; to prevent formation of habits of idleness; to teach city children organized play; to encourage reading of good books, magazines and morals of young people in places where bad language and evil companions are forbidden; to make children play fairly, honorably and honestly; to bring real happiness to many children who are deprived of the pleasures which are the rightful heritage of children.

Dr. Stitt's suggestions were:

"Install bowling alleys in waste places in cellars of large school buildings; make larger use of auditoriums for public meetings; encourage mixed dancing classes in school halls; give moving picture shows at least once a week; maintain information bureaus in many schools from 7 to 9 p. m.

Dr. Howard Bradstreet, director of the bureau of recreation, park department, New York City, spoke on "A System of Public Recreation for a City." He said in part:

"The playground is more than a place for amusement. It can and should be a factor in constructive development of citizenship. While the city may easily provide pure water, milk, police or fire protection, it is not easy to make appeal to the free will of a very self-willed part of the community, and more than a commissioner is necessary. The governing board should contain a citizen representation."

At the morning session the speakers were Joseph Lee, president of the Playground Association of America, whose subject was "What Play Means," and Ernest Hermann, superintendent of playgrounds and director of physical education in Cambridge, who spoke on "Playgrounds for Children Under 10."

Association of County Highway Commissioners of Wisconsin.—An association with this title was formed at Madison, Wis., March 3. The following officers were elected: President, George F. Post, Spring Green; vice-president, F. M. Sargeant, Ladysmith; secretary and treasurer, Prof. W. O. Hotchkiss, Madison.

The association listened to Senators J. S. Donald, of Mount Horeb; Timothy E. Burke, of Green Bay, and E. E. Browne, of Waupaca, who explained the highway bills pending before the Legislature. Assemblyman L. E. Gettle, of Edgerton, also spoke on the subject. The association appointed a committee which drafted resolutions expressing the views of the association on the creation of an unpaid state highway commission and the subject of good roads.

Kensington, Pa., Board of Trade.—Clean streets and more lights were the leading subjects of discussion by members of the Kensington Board of Trade at their annual meeting last week. The reports of William T. Weir, Jr., secretary, and Robert McNeil, treasurer, show the organization to be in excellent condition. Among the improvements pointed out in the secretary's report were the 19 new electric lights that have been secured for Front street and Kensington avenue, the opening of North Front street, the opening of the Pennsylvania station at Front and Norris streets and a general increase in business. The following were elected officers: President, A. C. Keeley; first vice-president, Samuel Reinheimer; second vice-president, Gustav Lipschuetz; third vice-president, John B. Reynolds; treasurer, Robert McNeil; secretary, William T. Weir, Jr., corresponding secretary, Harry Derbyshire.

Playground Association of America.

—April 6, 7 and 8 have been chosen by the Playground Association of America as the dates for the playground institute to be held in Minneapolis, Minn. At this meeting representatives will be present from Wisconsin, Illinois, Iowa, Kansas, Missouri, Nebraska, North and South Dakota and Minnesota. Prominent speakers will lecture on the organization and administration of the association from different cities where they are now located and visiting members will discuss topics of general interest. Those prominently connected with the national association are ex-President Theodore Roosevelt, Hon. Joseph Lee, Mrs. Lovell White, Jacob Riis and many other noted social and educational workers.

Montclair Municipal Art Commission.

—The Art Commission organized as a subsidiary to the Montclair Civic Association, has submitted its final report to the directors of the parent body. The report, which was prepared by Emerson P. Harris, told for what purpose the commission was organized—the beautifying of Montclair—and said that there was no further need for its existence. The Montclair Art Association, the report stated, had taken charge of the \$50,000 gift for an art museum made by Mrs. Lang. The further work, it was stated, could best be done by a special committee of the Civic Association named for this purpose. The report was accepted and the commission discharged, with thanks.

Massachusetts Highway Association.

—Added interest in the coming conference on street cleaning, to be held in this city in May, is occasioned by announcement that the quarterly meeting of the Massachusetts Highway Association will take place here on the same day and in connection with the conference. The committee of arrangements has decided on May 11 as the date of the conference and the headquarters of the Board of Trade as the place. There will be morning and afternoon sessions and possibly a special event in the evening. The members will meet in Worcester and travel by automobile over roads built last year by the Highway Commission to Springfield. There will be a paper read at the afternoon meeting on "City Ordinances, Police Control in Street Cleaning Work," prepared jointly by James H. Sullivan, Division Engineer Boston Street Department, and Superintendent Arthur A. Adams, Springfield.

Calendar of Meetings

- March 21-22.**
New York State Railroad Association.
—Quarterly Meeting, Syracuse, N. Y.—
C. Gordon Real, Secretary, Kingston,
N. Y.
- April 6-8.**
American Electrochemical Society.—
Annual Meeting at New York City.—
Secretary, Joseph W. Richards, Lehigh
University, South Bethlehem, Pa.
- May.**
City Commission Congress.—Meeting.
Galveston, Tex.—Mayor Lewis Fisher,
Chairman of Committee, Galveston, Tex.
- May 11.**
Massachusetts Highway Association.—
Quarterly Meeting in conjunction with
the New England Conference on Street
Cleaning, Springfield, Mass.
- May 18-19.**
Ohio Society of Mechanical Steam and
Electrical Engineers.—Annual Conven-
tion, Youngstown.—F. E. Sanborn, Secre-
tary, Ohio State University, Columbus.
- May 29-June 3.**
National Electric Light Association.—
Annual Convention, Engineering Societies
Building, New York, N. Y.
- June 6-10.**
American Water Works Association.—
Thirty-first Annual Convention, Powers
Hotel, Rochester, N. Y.—John M. Diven,
Secretary, 14 George street, Charleston,
S. C.
- June 11-16.**
International Association of Chiefs of
Police.—Eighteenth Annual Convention,
Rochester, N. Y.—Major Richard Syl-
vester, Superintendent of Police, Wash-
ington, D. C., President.
- June 13-18.**
New York State Association of Chiefs
of Police.—Annual Convention, Roches-
ter, N. Y.
- June 13-16.**
American Society of Civil Engineers.—
Annual Convention, Chattanooga, Ten-
nessee.—Charles Warren Hunt, Secretary,
220 West 57th St., New York.
- October 4-6.**
League of American Municipalities.—
Annual Convention, Atlanta, Ga.—John
MacVicar, Secretary, Des Moines, Ia.

PERSONALS

BUDD, W. E., has been appointed Treas-
urer of the Asphalt Block Paving Co.
of Toledo, Ohio.

COLLINS, WALTER L., has been elected
President of the Boston City Council.

CONKLIN, DENNIS P., Assistant Fire
Chief of Saratoga Springs, is dead.

CRAIG, WILLIAM J., has been re-elected
Mayor of Victoria, Tex.

DALLACH, A. C., has been chosen Mayor
of Wenatchee, Wash., by the City Coun-
cil, succeeding C. B. Halbert, resigned.

DILLMAN, S. M., a civil engineer of
Altoona, Pa., has been appointed by the
Mayor to assist in making tests of pav-
ing brick to be used in the city.

DOBBINS, JOHN W., has resigned as a
member of the Board of Health of New-
ark, N. J.

DUNWOODY, C. E., a chemist of the
Rensselaer Institute, of Troy, N. Y., has
been appointed to take charge of the puri-
fication plant at Erie, Pa.

ELVERSON, JAMES, JR., has been ap-
pointed a member of the Park Commis-
sion of Philadelphia, Pa., to succeed his
father, the late James Elverson.

ENGLAND, CHARLES, has been elected
chairman of the Sewerage Commission
of Baltimore, to succeed the late Gen.
Peter Leary, Jr.

FERGUSON, CHARLES S., former City
Engineer, has been appointed Superin-
tendent of the City Water Works of
Lorain, Ohio.

FORD, FREDERICK L., City Engineer of
Hartford, Conn., who has been in the
service of the city for the past fifteen
years, has resigned his position, to take
effect April 1, and will go into business
as a member of the engineering firm of
Ford, Buck & Sheldon.

FORSYTHE, DR. A. A., has been re-elect-
ed Mayor of Monroe, La.

FROMELL, DR. BERTHA F., has the dis-
tinction of being the first woman ever
elected to the Board of Health of Fair-
haven, Mass.

FUERTES, J. H., of New York, an ex-
per hydraulic engineer, has been engaged
in making an examination of conditions
in Cumberland, Md., in connection with
a new water supply, and has made his
recommendations to the Mayor.

GAILBREATH, W. M., has been elected
Mayor of Gainsboro, Tenn.

GOLDEN, P. N., of New York City, has
been appointed Superintendent of the
Middletown, Conn., electric plant.

HAYES, ROWLAND B., has been ap-
pointed Playground Expert by the Play-
ground Association of America. He
will spend most of his time in New York,
but will visit cities all over the country
with a view to giving assistance and help-
ful suggestions. He will shortly visit
Utica, to make an investigation.

KELLY, DAVID I., has been appointed
an Assistant Fire Marshal of New York
City.

KLOPPER, HENRY, has been appointed
Chief of Police of Fremont, Ohio.

SMITH, THOMAS S. A., has been ap-
pointed Street Commissioner of Me-
tuchen, N. J.

NAKUINA, MRS. EMMA M., an American
woman now living at Kalihi, has made
herself a power in Hawaii. She holds an
unusual position in the Territorial Gov-
ernment. She is a water rights commis-
sioner, acting as judge to decide cases
where the rights are in litigation, and is
considered an able and just official. She
is the great-granddaughter of Captain
Metcalf, of the *Eleanor*. Of distinguished
ancestry on both sides, well educated and
possessing literary ability, she is deeply
interested in the welfare of the Hawaiian
people.

PARKER, J. C., has been re-elected Mayor
of Bemidji, Minn.

STECKLER, CHARLES, has been appointed
by the Mayor as a member of the Court
House Commission of New York City,
an honorary body appointed to select the
site for the proposed new county court
house.

SMALLEY, JOHN D., of Hammond, Ind.,
for six years controller of Hammond, has
been advanced to the office of Mayor,
with the appointment of Lawrence Becker
as judge of one of the new superior
courts.

WALLACE, JOSEPH MCD., has retired as
Assistant Cashier of the Boyle Bank and
Trust Company, after having held the po-
sition for forty-three years, to become
Mayor of Danville, Ky. He has been
chosen by the City Council to succeed
Mayor Woolfolk, who resigned.

WARNER, C. A., has been appointed City
Engineer of York, Pa.

WAY, GUY, Chief of the Fire Depart-
ment of Muncie, Ind., has resigned.

MAYORALTY ELECTIONS

MAINE

Auburn—Irving L. Merrill.
Bath—Frank A. Small.
Eastport—Walter J. Garnett.
Ellsworth—Chas. A. Leland.
Gardner—Bert E. Lamb.
Hallowell—Emory O. Veane.
Lewiston—Frank A. Morey.
Rockland—G. Herbert Blethen.
Saco—Walter J. Gilpatrick.
South Portland—John A. S. Dyer.
Waterville—Wm. R. Pattangal.

VERMONT

Burlington—Robert Roberts.
Montpelier—S. S. Balarid.
Rutland—P. W. Clement.
St. Albans—S. V. Green.

TRADE NOTES

Cast Iron Pipe.—Chicago: There is
an increased demand for pipe from
small municipalities. Gas companies
are purchasing freely. Quotations: 4-
inch, \$25.50; 6 to 12-inch, \$24.50; 16-
inch and up, \$24. Birmingham: An-
nouncement of a number of large let-
tings from Southern cities has been
received and the demand for small
lots continues good. It is expected
that producers will insist on higher
prices than have been quoted hereto-
fore. It is understood that all plants
will soon resume operations at normal
capacity. Quotations: 4 to 6-inch, \$22;
8 to 12-inch, \$20; over 12-inch, average,
\$19. New York: The general demand
continues quiet. Prices appear to be
no stronger. Quotations: 6-inch, car
loads, \$21 to \$22.

Lead.—Market decidedly unsatisfac-
tory. Quotations: New York, 4.40c.;
St. Louis, 4.25c.

House Fly Campaign.—The Educa-
tional Exhibition Company, 70 Water-
man street, Providence, R. I., have pre-
pared material for use in sanitary cam-
paigns against the house fly. The sim-
plest of these are rubber stamps, for
which various uses are suggested, such
as prizes for essays by school children.
A set of 35 lantern slides have been
prepared for illustrating lectures.

Auto Patrols.—The Police Depart-
ment has put in commission two auto-
patrol wagons, made by the Stude-
baker Brothers Manufacturing Com-
pany, South Bend, Ind. Each machine
can carry 12 people. Other details are:
Speed, 45 miles per hour; horsepower,
48; wheel-base, 120-inch; wheels, 36-
inch diameter; tires, 5-inch; length, 20
feet; height, 8 feet. The wagons are
painted dark blue and have lettering
and trimmings of gold.

Wagons.—The Ft. Worth Wagon
Company was recently organized at
Ft. Worth, Tex., with a capital stock of
\$150,000. The incorporators are Warren
Heaton, C. Hightower and John F.
Shelton.

Steam Rollers.—Indicating that there
is to be no cessation of road construc-
tion and improvement in the Philip-
pines, the Iroquois Iron Works, Buf-
falo, N. Y., has just received an order
for six 10-ton macadam steam rollers
for immediate shipment to Manila. At
the same time the United States Gov-
ernment ordered a 10-ton Iroquois mac-
adam roller for delivery at Washing-
ton, D. C.

Street Car.—A new pay-as-you-enter
type of street car, built by the Brook-
lyn Rapid Transit Company, was re-
cently put in commission. The great-
est advantage claimed for the car is the
safety which it affords to passengers.
The doors of the rear platforms fold
inward upon the operation of a lever
by the conductor. When the doors are
closed by him from within, the plat-
form step automatically folds up close
to the platform, so that no one can
board the car while it is in motion.
The front door and steps are similarly
operated by the motorman. Other fea-
tures of the car include an anti-tele-
scoping bumper.

Water Company.—George L. Smith,
Louisville, Ky., has purchased a con-
trolling interest in the Cadiz Water
Company, Cadiz, Ky., terminating a
stockholders' fight which has been on
for several months. Mr. Smith has
become president of the company, and
is planning improvements in the plant.

Refuse Destructors.—The Destructor Company, 111 Broadway, New York, advises that the Heenan Destructor, which they are building for the City of Montgomery, Ala., is nearing completion, and that the following cities have placed contracts with them for Heenan high-temperature destructors:

San Francisco, Cal., two complete plants, one for Islais Creek district of 120 tons capacity per day, the other for North Beach district, of 360 tons capacity per day. These two plants are designed on the unit principle, the former containing two 60-ton destructors, and the latter designed to contain six 60-ton units, only two of which, however, are being constructed at this time.

New York City, one 90-ton plant for the Clifton district, containing two 45-ton units. It is interesting to note that this plant has been contracted for after three years' use of the 60-ton plant which was installed for this city in the West New Brighton district.

Havana, Cuba, has also placed a contract for one of the largest destructor plants ever built. This has a capacity of 500 tons per 24 hours, and consists of four Heenan destructor units of 125 tons each.

Seattle, Wash., is also duplicating the plant which they have used with success for the past five years. This plant is of the high-temperature type, following the Meldrum design.

Road Machinery.—Within a few weeks the J. I. Case Threshing Machine Company, Racine, Wis., will issue their first catalogue of road-building appliances. The catalogue will cover 64 pages, and will include the following lines: The 10-ton power steered road roller, municipal tractor engines, contractors' hauling engines, Troy bottom dump wagons, Troy reversible wagons, Troy dump boxes, Case rock crushers, Case rotary stone screens, Case perfection road graders, road drags, road plows, township plows, fuel and water engine tenders, stationary engines, etc.

Catalogues and Price Lists.—An American consulate in South Africa is in receipt of a request from a large local firm for catalogues and price lists descriptive of cable conveyors, the information being desired for a client and probable purchaser of such machinery. This and numerous other requests for catalogues and price lists of American products illustrate the value to American manufacturers of having on file at consular offices catalogues and other literature descriptive of their goods and also the names of their representatives, if any, to whom inquiries could be referred. This consulate now has a large number of catalogues of American manufacturers and is constantly adding to the list, but the more generally American concerns avail themselves of the opportunity to be thus represented at consular offices the greater will be the benefits accruing to American trade. Address No. 2620, Bureau of Manufacturers, Washington, D. C.

Engineering Firm.—Lewis & Kitchen, Engineers, 1200 Michigan Boulevard, Chicago, Ill., announce a change in their copartnership. S. R. Lewis, son of E. C. Lewis, has become a member of the firm. Lewis & Kitchen are engaged in the business of designing and constructing septic tanks, garbage crematories and sewage disposal works. The business will be conducted under the same name with offices in Chicago and Kansas City, Mo. The factory is in Kansas City, Mo.

Large Gas Engines.—The Wisconsin Engine Company, Corliss, Wis., has made a very considerable addition to its equipment and working capital in order to allow it to enter new lines of manufacture. The principal business of the company is the manufacture of Corliss engines, which may be operated at higher speeds than the ordinary design of Corliss engine. The new business, however, is principally the manufacture of Adams gas engines, which will be made in sizes from 200 to 3,000 horsepower in a single unit.

Somers System of Taxation.—The Somers system of real estate valuation for taxation purposes probably will be used in Milwaukee, Wis., this spring. The special committee on taxation of the Common Council has decided to recommend the adoption of the system. The Somers system, as proposed, will be used only to value real estate, the portion of the proposition relative to the valuation of buildings having been turned down by the committee. According to the agreement signed by the representatives of the Manufacturers' Appraisal Company, Cleveland, O., owner of the Somers patents, the company will grant to the city the use of the tables, rules and mechanical devices needed during 1911 and will provide experts who will instruct the city officials in the system, and supervise the work. The city will pay the company 11 cents for each parcel of land valued by the system, the total not to exceed \$9,000. The experts of the Appraisal Company will begin work on May 1, and the work must be finished by the last Monday in June.

Large Water Meter Factory.—The Gannon Company, Newark, N. J., manufacturers of the Watch Dog water meter, have moved from their old factory, 81 Mt. Prospect avenue, to a new plant, 282-296 South street, Newark, which is said to be the most modern and up to date in the world used exclusively for the manufacture of water meters. The plot occupied is 200 by 209 feet, and space is reserved for contemplated additions to the plant. The main building is 208 feet long by 30 feet wide, and the foundry extension is 25 by 50 feet. Columns have been entirely omitted, steel beams spanning from wall to wall, and the floors are of mill or slow burning construction, especially suited for factory buildings. Power will be electric current, furnished by the Public Service Corporation, driving a number of motors located in various parts of the building and the heating will be done by steam. The building was built rapidly, ground having been broken November 28, last. A. W. Jacobi was the engineer.

Drilling Wells.—F. A. Champlin, of East Longmeadow, Mass., one of the best-known drillers of artesian wells in New England, has had a large increase in his business during the last year over that of the year preceding. In 1909 he drilled 65 wells, while during 1910 the number went to 100. The eight wells drilled for Smith & Wesson, of Springfield, were put down 500 feet, and yield 100 gallons a minute. The eight wells for the Hotel Kimball, in Springfield, are 445 feet deep, and yield an equal amount. These are among the deepest wells drilled, although eight wells for the Farr Alpaca Company, of Holyoke, were drilled 500 feet deep. The deepest well drilled in the year by Mr. Champlin was for Francois Marvail, of Holyoke, and is 584 feet deep. Some of the wells, however, are only 50 feet deep and some even less.

Garbage Wagons.—The Barron & Cole Company, Franklin street and West Broadway, New York, recently supplied six garbage wagons to the city of Passaic, N. J., of which the following is a description: They are of the bottom-dump style, with a capacity of 4 cubic yards. The inside is lined with 12-gauge steel and at the front and rear of the top there is a semi-circle of wood with a pole running between. The wagon is fitted with attachment for a canvas cover over this pole so that dry garbage can be loaded if desired. All four wheels have tires 4 x 5/8, and the wheel base is 9 feet 10 inches. The wagons are also equipped with brakes. The woodwork had two coats of paint and two coats of red lead. The body was made a slate color and the wheels a dark red. The lettering on the wagon was D. P. W., City of Passaic, and they were numbered from 1 to 6.

Chief's Motor Car.—The Viele car made at Moline, Ill., has been undergoing tests by the Boston Fire Department as a chief's car. The automobile was placed in actual fire service for a week, carrying Battalion Chief Madison about on his regular duties, responding to all alarms for inspection work and throughout the Fire Department routine. It was driven by three different drivers to prove the ease in handling the machine. The Viele as a municipal service car has been used by the Superintendent of Streets, Lowell, Mass., and by the sheriff at Providence, R. I., as a patrol.

Kyrock.—The Wadsworth Stone & Paving Company, Pittsburgh, Pa., owners of the process of laying Wadsworth macadam, have registered the name Kyrock for use in connection with their business. The Wadsworth macadam in new construction consists of a rolled stone base, 6 inches deep, made of stones varying from 2 to 4 inches in diameter, an upper course 2 1/2 inches deep of not exceeding 2 1/2 inches in diameter, also rolled, and finally a top dressing 3/4 inch deep, loose measure, of pulverized Kentucky sandstone rock asphalt. In resurfacing old macadam roads the bare stone is omitted and the upper course made of such thickness as will make a suitable contour for the finished road.

Pumps.—The Harris Pump & Supply Company, Pittsburgh, Pa., has increased its capital stock from \$60,000 to \$80,000.

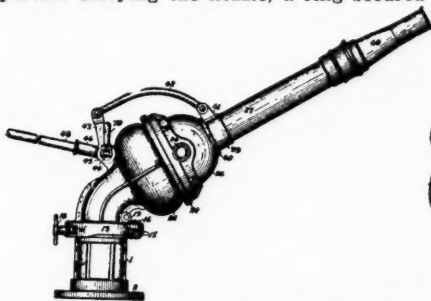
Smoke Consumers.—Manufacturers of smoke consumers will be able to market their devices to better advantage in the South, as many municipalities have taken up an active campaign to reduce smoke emission. The Board of Trade of Louisville is working on this project, while Nashville and Knoxville, in Tennessee, have strict ordinances under consideration. In this connection the formation of the National Smoke Preventer Company, at Louisville, is of interest. It will sell a smoke preventer manufactured by L. H. Long, a local launderer. W. P. Davis, sales agent for a number of iron and steel companies, is interested in the project.

Fire Alarm.—The Gamewell Fire Alarm Telegraph Company have completed the installation of the new signal system for Grand Rapids, Mich. There will be no more muddled alarms that have worried the firemen and filled the citizens of Grand Rapids with apprehension lest the whole system should fail. The new system is the non-interfering system with manual transmitter.

PATENT CLAIMS

984,557. HIGH-PRESSURE NOZZLE. Henry H. Gorter, San Francisco, Cal. Serial No. 519,035.

In a high-pressure nozzle the combination of a tubular outer portion formed in its inner surface with a lower runway for balls, a nozzle, a sleeve within said outer portion carrying the nozzle, a ring secured

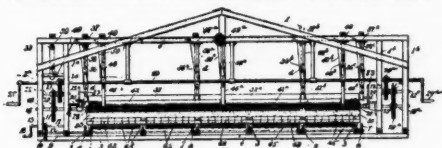


upon the lower end of said sleeve, a ring of balls between said ring and runway, said sleeve having at its upper end a flange, and rollers carried by said flange, bearing against the side of said tubular portion adjacent to the nozzle, the axis of said rollers being parallel with the axis of the sleeve, substantially as described.

984,853. FIRE-EXTINGUISHING COMPOSITION. William S. Rheem, Oakland, Marvin L. Chappell, Berkeley, and John C. Black, Stege, Cal., assignors to Standard Oil Company, Richmond, Cal., a Corporation of California. Serial No. 532,105. A charge for fire extinguishers comprising glue, and separated solutions adapted on being brought together to produce a gas which is incombustible and a non-supporter of combustion, and to form a foam with the glue, said glue being an ingredient of at least one of said solutions.

984,747. MACHINE FOR MAKING REINFORCED CONCRETE PILES, COLUMNS AND THE LIKE. Alexander Crawford Chenoweth, New York, N. Y., assignor of one-half to John McNamee, Brooklyn, N. Y. Serial No. 407,276.

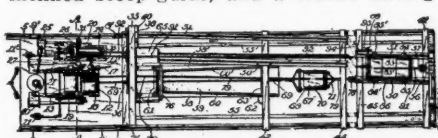
In a machine for making reinforced concrete piles, columns and the like, the combination of a movable platform on which a reinforced sheet of material is rolled into



a compact body, means for rolling the sheet into a body, reels or bobbins for receiving wire adapted to be attached to the outer end of the reinforcing part of said sheet of material, whereby when the body has been rolled into form the continued revolution of the said body serves to wind the said wires upon the exterior of the same.

985,546. SCRAPING EXCAVATOR AND CONVEYOR. Joseph L. Potter, Indianapolis, Ind. Filed Nov. 1, 1909. Serial No. 525,674.

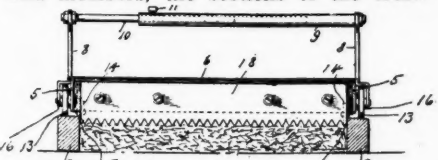
An excavator and conveyor including an inclined scoop-guide, and a trestle having



track-rails thereon arranged in a plane intersecting the plane of the scoop-guide.

985,214. PAVING TOOL. Aaron W. Shroyer, Durham, N. C. Filed Oct. 4, 1910. Serial No. 585,177.

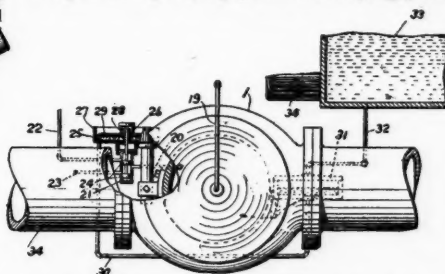
A paving tool comprising spaced side members, a sectional cross-bar connecting said members, the sections of the cross-



bar being adjusted relatively to each other in the direction of their length, means for holding the sections in adjusted position, and a scraper blade carried by the cross-bar.

984,820. VALVE MECHANISM. John Ledoux, Swarthmore, Pa. Serial No. 464,940.

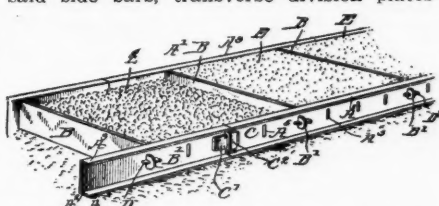
In a valve mechanism, in combination with a conduit and a reservoir with which said conduit is connected, a casing having a port in said conduit, a piston valve disposed in said casing so as to be operated by the pressure of liquid in said conduit to open said port, a pipe for conveying pres-



sure to said casing to cause said valve to close said port, a valve for controlling the flow through said pipe, a vessel, a float in said vessel, means for connecting said valve last named with said float, and means for connecting said vessel and reservoir whereby said float is operated by changes of head in said reservoir.

985,035. FORM FOR THE CONSTRUCTION OF CONCRETE WALKS, FLOORS, CURBS, GUTTERS AND LIKE STRUCTURES. Mark Stewart Hotchkiss, Binghamton, N. Y. Serial No. 596,075.

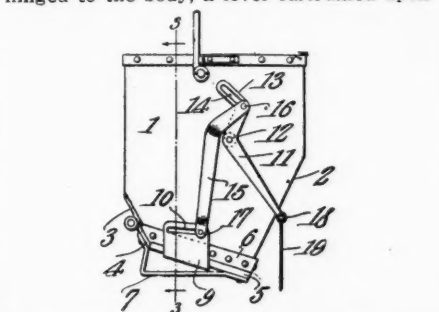
A sectional form comprising metal side bars provided with interlocking end-engaging means on a side face of the side bars, and slots intermediate the ends of said side bars, transverse division plates



having shoulders adapted to abut against the said side bars and tongues adapted to be inserted through the slots in said bars, and means engaging said tongues to secure the parts in position, said bars and division plates making a guide for striking-off, substantially as described.

985,578. BOTTOM-DOOR DUMP BUCKET. George Focht, Hoboken, N. J. Filed Dec. 24, 1909. Serial No. 534,775.

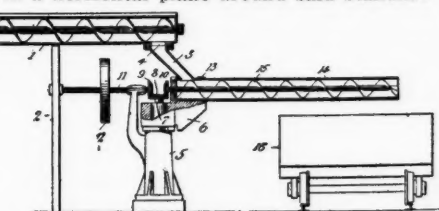
A bucket comprising a body, a door hinged to the body, a lever fulcrumed upon



the body, and a link slidably and pivotally connected with both the lever and the door.

985,436. CAR AND VEHICLE LOADER. William D. Mount, Saltville, Va. Filed Mar. 24, 1910. Serial No. 551,264.

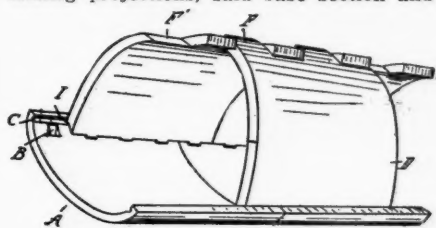
A car loader comprising an upright standard, a conveyor having a swiveled connection therewith, and adapted to rotate in a horizontal plane around said standard



as an axis, a fixed conveyor located above said standard, and an inclined chute having a swiveled connection at one end with said fixed conveyor and terminating at its opposite end in said movable conveyor with its rotating axis coinciding with the axis of the movable conveyor.

985,539. CULVERT. Frank Ottney, Charlotte, Mich. Filed May 7, 1910. Serial No. 560,028.

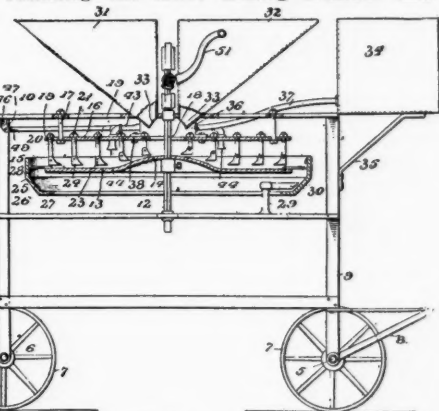
A sectional culvert, comprising a base section having a plurality of apertures along each of its longitudinal marginal edges, side sections provided with lugs at their lower ends for engaging said apertures and at their upper ends with interlocking projections, said base section and



each of said side sections being provided with a tongue and groove engagement for locking the side sections to the base in the assembled relation of the parts, one of the co-operating portions of the tongue and groove engagement being formed upon the base intermediate the longitudinal marginal edge of the latter and said apertures, and the other upon the side section above said lugs.

985,602. CONCRETE MIXER. Walter L. Jones, Thomson, Ill. Filed June 22, 1909. Serial No. 503,743.

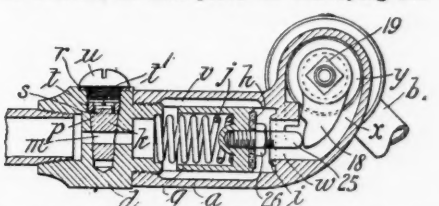
A mixing machine including a supporting frame, a stationary mixing member, a movable mixing member spaced from the stationary member, a receiving trough surrounding the lower mixing member and



movable therewith, agitation fingers depending from the stationary member and adjustable to either retard or accelerate the flow of material to the receiving trough, and a stationary scraper for removing the material from the receiving trough.

985,166. SANITARY DRINKING FOUNTAIN. John Hall, Jr., West Springfield, Mass. Filed Feb. 26, 1910. Serial No. 546,128.

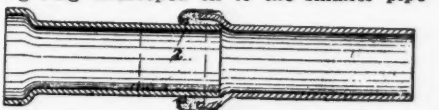
A drinking fountain having in combination with a barrel element, a valve mounted therein, an arm-piece for conveying the



liquid, and an adjustable connection between the arm-piece and said valve, whereby any wear therebetween may be compensated for, as described.

985,182. JOINT-PROTECTOR FOR SEWER-PIPES. Frederick W. Lang, Minneapolis, Minn. Filed July 7, 1910. Serial No. 570,745.

The combination with pipe sections, the one having a large end telescoped over the smaller end of the other, of a pliable packing ring telescoped on to the smaller pipe



end, adjacent to the larger pipe ends, an annular metal shield telescoped over the said packing ring and the large pipe end, and cement contained within said shield and forming a tight joint between the pipe sections, substantially as described.

THE WEEK'S CONTRACT NEWS

Relating to Municipal and Public Work—Street Improvements—Paving, Road Making, Cleaning and Sprinkling—Sewerage, Water Supply and Public Lighting—Fire Equipment and Supplies—Bridges and Concrete Work—Sanitation, Garbage and Waste Disposal—Police, Parks and Miscellaneous—Proposals and Awards

To be of value this matter must be printed in the number immediately following its receipt, which makes it impossible for us to verify it all. Our sources of information are believed to be reliable, but we cannot guarantee the correctness of all items. Parties in charge of proposed work are requested to send us information concerning it as early as possible; also corrections of any errors discovered.

BIDS ASKED FOR

STATE	CITY	RECEIVED UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
STREET IMPROVEMENTS				
Indiana.....	Paoli.....	Mar. 17, 2 p.m.	Constructing gravel road.....	A. B. Ham, County Auditor.
Ohio.....	Cincinnati.....	Mar. 17, noon	Improving portion of Third Avenue.....	Stanley Struble, Pres. Bd. Comrs.
Michigan.....	Muskegon.....	Mar. 17, noon	Furnishing 14,200 cu. yds. of road building material.....	John B. Barlow, County Clerk.
Pennsylvania.....	York.....	Mar. 17, noon	Paving various highways with bitulithic, vitrified brick, compressed concrete, asphalt, wood blocks, or any other known and approved paving material.....	S. W. Bahn, Chm. Hwy. Com.
Ontario, Can.....	Oshawa.....	Mar. 18.....	Constructing 4,300 lin. ft. asphalt block pave. on two streets.....	Frank Chappell, Town Engr.
Indiana.....	Anderson.....	Mar. 20, 10 a.m.	Constructing various County roads of gravel.....	Wm. T. Richards, County Auditor.
Virginia.....	Portsmouth.....	Mar. 20, noon	Paving various streets.....	L. P. Slater, City Clerk.
Indiana.....	Greenfield.....	Mar. 20, 10 a.m.	Grad. gravel road in Sugar Creek.....	C. H. Troy, County Auditor.
Kansas.....	Topeka.....	Mar. 20, 2:30 p.m.	Grading 11 blocks, cement curb and gutter.....	C. B. Burge, City Clerk.
New York.....	Albany.....	Mar. 20, 22, 24	Building state roads, 66 pieces.....	State Highway Commission.
Virginia.....	Newport News.....	Mar. 20, noon	Constructing concrete curb and gutter.....	George E. Via, Chm., Com. on Highways and Sewers.
Ontario, Can.....	Petrolia.....	Mar. 20, 5 p.m.	Constructing about 6,000 sq. yds. brick pavement and 2,500 lin. ft. concrete curb and gutter.....	J. McHattie, Town Clerk.
Oklahoma.....	Muskogee.....	Mar. 20, 5 p.m.	Paving about 3,500 lin. ft. with asphalt macadam; 4,350 lin. ft. asphalt.....	Chas. Wheeler, Jr., City Clerk.
Kansas.....	Lawrence.....	Mar. 20, 5 p.m.	Paving various streets and alleys with brick.....	F. D. Brooks, City Clerk.
Illinois.....	Peoria.....	Mar. 20, 2 p.m.	Repaving Harrison Street with asphalt.....	Geo. F. Simmons, Pres. B. L. Imp.
Missouri.....	Webb City.....	Mar. 20.....	Paving with macadam, curbing and guttering, and constructing concrete sidewalks on 1/2 mile of Madison st.....	L. A. Walker, City Clerk.
Ohio.....	E. Youngstown.....	Mar. 20.....	Constructing sidewalks and crosswalks during year 1911.....	M. J. Carney, Jr., Village Clerk.
Michigan.....	Adrian.....	Mar. 20, 9 p.m.	Furnishing 550,000 first quality repressed paving block.....	John Mawdsley, City Clerk.
California.....	Covina.....	Mar. 21.....	Improving Citrus Ave., requiring 74,000 sq. ft. asphalt concrete pavement, 140,500 oil macadam pavement, 29,250 sq. ft. concrete gutter, 2,700 lin. ft. concrete curb and 4 reinforced concrete culverts.....	A. M. Pence, City Clerk.
Rhode Island.....	Providence.....	Mar. 22, 2:15 p.m.	Furnishing 275,000 granite paving blocks.....	Henry Fletcher, Chm. B. C. & S.
Virginia.....	Fort Monroe.....	Mar. 21, 10 a.m.	Constructing macadam walks and roads.....	Capt. R. B. McBride, Con.Q.M.U.S.A.
Texas.....	Beaumont.....	Mar. 21, 10 a.m.	Repaving portion of Pearl Street.....	J. G. Sutton, City Secy.
New York.....	Buffalo.....	Mar. 23, 11 a.m.	Repaving and paving various streets.....	Francis G. Ward, Comr.
Wisconsin.....	Burlington.....	Mar. 24, 2 p.m.	Paving with brick, cement, curbing and guttering certain streets.....	P. J. Hurtgen, Chm. Bd. Pub. Wks.
Ohio.....	Cincinnati.....	Mar. 24, noon	Improving Broadwell road.....	Stanley Struble, Pres. Co. Comrs.
Ohio.....	Columbus.....	Mar. 24, noon	Grading and macadamizing 2.10 miles road.....	Jas. C. Wonders, State Hwy. Comr.
Ohio.....	Richwood.....	Mar. 25.....	Paving with vit. brick portions of various streets.....	Ray L. Jordon, Village Clerk.
Wisconsin.....	Watertown.....	Mar. 25, 2 p.m.	Paving with vitrified block about 7,500 sq. ft.; 3,650 lin. ft. combined curb and gutter, 2,845 cu. yds. excavation.....	F. S. Weber, Chm. Bd. Pub. Wks.
Wisconsin.....	Racine.....	Mar. 25, 10 a.m.	Paving and grading various streets.....	P. H. Connolly, Chm. Bd. P. Wks.
Indiana.....	Evansville.....	Mar. 25, 10 p.m.	Furnishing broken rock and screenings from May 1, 1911 to May 1, 1912.....	Simon A. Bartholome, Clk. D. P. W.
Ohio.....	Belle Valley.....	Mar. 28, noon	Grading and paving with brick 0.9 mile of road, in Noble Twp.....	S. G. Brown, Engr.
Ohio.....	Cleveland Hghts.....	Mar. 28.....	Improving Berkshire Road.....	H. H. Canfield, 309 Beckman Bldg., Cleveland, Village Clerk.
Ohio.....	Bowling Green.....	Mar. 28, 1 p.m.	Grading, draining and macadamizing three roads.....	F. W. Toan, County Auditor.
New York.....	Poughkeepsie.....	Mar. 30, 4 p.m.	Paving 13,000 sq. yds. of brick pavement.....	Robt. J. Harding, Supt. Pub. Wks.
North Carolina.....	Wilmington.....	Mar. 31, noon	Paving and curbing portion of Sixth street.....	Commissioner of Streets.
Indiana.....	Logansport.....	Apr. 1.....	Constructing 50,000 sq. yds. of sheet asphalt.....	William Pickett, City Clerk.
Iowa.....	Bronson.....	Apr. 3, noon	Road work in Floyd Township.....	H. H. Onstot, Clerk.
Indiana.....	Madison.....	Apr. 4, 1 p.m.	Construction of gravel road.....	Andrew M. Taff, County Auditor.
Alabama.....	Wetumpka.....	Apr. 4, 11 a.m.	Grading and surfacing about 30 miles of sand-clay road.....	County Commissioners.
North Dakota.....	Rugby.....	Apr. 5, 2 p.m.	Metal culverts and road machinery for year 1911.....	Henry Albertson, County Auditor.
Washington.....	Coupeville.....	Apr. 5.....	Improving Hinman Road No. 32.....	H. T. Wanamaker Aud. Island Co.
Maryland.....	Cambridge.....	Apr. 6, 11 a.m.	Grading, paving and curbing various streets.....	Henry Lloyd, Chm. St. Imp. Comn.
Maryland.....	Ft. Howard.....	Apr. 7, 11:30 a.m.	Constructing cement walks.....	Constructing Quartermaster.
New Jersey.....	Swedesboro.....	Apr. 15.....	Constructing Railroad Avenue.....	Wilmer Egee, Mayor.
SEWERAGE				
Pennsylvania.....	Williamsport.....	Mar. 17, noon	Building sewer in East End; Penn St. and Gratius run route.....	John B. Otto, City Engr.
Maryland.....	Ft. Washington.....	Mar. 20, 1:30 p.m.	Constructing sewer outlet and outfall.....	Capt. R. B. Kelton, C. Q. M. U.S.A.
Connecticut.....	Stamford.....	Mar. 20, 8 p.m.	Constructing various sewers.....	Jos. H. Provost, City Clerk.
Ohio.....	Grandview Hghts.....	Mar. 21.....	Constructing sewer and outlet.....	John Hinterschied, Village Clk.
West Virginia.....	Moundsville.....	Mar. 21, 10 a.m.	Constructing 26 miles of sewers.....	Oscar B. Bonar, City Clerk.
Ohio.....	Columbus.....	Mar. 21.....	Constructing sewer and outlet at Grand View.....	John Hinterschied, Clerk.
Ohio.....	Akron.....	Mar. 22, noon	Constructing sewers in various streets.....	John W. Gauthier, Dir. Pub. Serv.
Wisconsin.....	Burlington.....	Mar. 24, 2 p.m.	Constructing about 2,000 lin. ft. vitrified pipe sewer; 290 lin. ft. sanitary sewer, 7 manholes 18 10-in. 1/4 bends.....	P. J. Hurtgen, Chm. Bd. Pub. Wks.
Connecticut.....	Putnam.....	Mar. 24, 4 p.m.	Constructing about 10,000 ft. of sewers.....	Geo. W. Perry, Engr. Sewers.
North Dakota.....	Minot.....	Mar. 27.....	Constructing four miles of sewers.....	Board of City Commissioners.
Ohio.....	Cleveland Hghts.....	Mar. 28, noon	Constructing sewers in various streets.....	H. H. Canfield, Village Clerk.
Iowa.....	Indianola.....	Mar. 29, 7 p.m.	Bldg. sewer system in North Indianola.....	A. H. Gilliland, City Engineer.
Sask., Can.....	Moose Jaw.....	Apr. 10, 8:30 p.m.	Furnishing and laying about 30,700 lin. ft. tile pipe sewer, building manholes, etc.; separate bids. Con. sewage disposal plant, etc.....	W. F. Heal, City Clerk.
California.....	San Jose.....	July 3.....	Construct septic tank for County hospital.....	City Clerk.
WATER SUPPLY				
Illinois.....	Aurora.....	Mar. 17, 5 p.m.	Constructing 160 ft. brick chimney at pumping station; and furnishing two 230 H.P. Babcock & Wilcox type boilers.....	Board Public Works.
New Mexico.....	Fort Bayard.....	Mar. 18, 11 a.m.	Furnishing motor driven submerged type centrifugal or impeller type pump capacity 200 gals a minute.....	J. R. McAndrews, Con. Q.M., U.S.A.
Wisconsin.....	Watertown.....	Mar. 18, 7 p.m.	Laying c. i. pipe and spec. and construct. manholes for w. wks.....	Wm. F. Voss, Secy. Bd. W. Comrs.
Pennsylvania.....	Bristol.....	Mar. 20.....	Constructing water works and filtration plant.....	Jos. R. Grundy, Chm. Com.
Ohio.....	Fernbank.....	Mar. 20, noon	Furnishing water pipe and special castings.....	W. Ellwood, Wynn, Clerk.
South Dakota.....	Gettysburg.....	Mar. 20.....	Constructing water works.....	F. M. Wright, City Auditor.
New York.....	Westbury.....	Mar. 20.....	Constructing water works.....	Thos. J. McCord, Chm. B. W. Comrs.
Manitoba, Can.....	Souris.....	Mar. 20.....	Laying about 31,500 ft. standard c. i. water pipe and similar amount vit. sewer pipe; construct. building, furn. pumps, machinery etc.....	V. H. Williams, Town Engr.
Iowa.....	Nevada.....	Mar. 20, 7:30 p.m.	Extending city water plant.....	R. A. Davis, City Clerk.
New York.....	New York.....	Mar. 21, 11 a.m.	Constructing drainage equipment for underwatering the shafts and tunnel of the Roundout siphon of the Catskill Aqueduct.....	Chas. Straus, Pres. Bd. Water Sup.

BIDS ASKED FOR

STATE	CITY	RECEIVED UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
WATER SUPPLY (Continued)				
Texas.....	San Augustine...	Mar. 21.....	Furnishing mat. for construction of w. w. system.....	Mayor.
Texas.....	Ft. Sam Houston	Mar. 21, 11 a.m.....	Furnishing compound or triple expansion pumping engine capacity 1,000,000 gals in 24 hours.....	P. W. Guiney, Con. Q.M. U.S.A.
Ohio.....	Columbus.....	Mar. 21.....	Laying water mains and water pipes at Grand View.....	John Hinterschied, Clerk.
British Col. Can	Vancouver.....	Mar. 22.....	Furnishing water pipe, fire hydrants and pig lead.....	W. A. Clement, City Engineer.
Texas.....	Lufkin.....	Mar. 24.....	Constructing water works, includ. boilers, pumps, motors etc..	C. N. Humason, Mayor.
Ohio.....	Cleveland.....	Mar. 24, noon.....	Furnishing valves for the Water Dept.....	A. B. Lea, Dir. Pub. Serv.
Indiana.....	Nat. Mil. Home...	Mar. 25.....	Install. mach. for imp. water sup. at Marion Bch., N.H.D.V.S.	J. W. Sanderson, Treas.
Ont., Can.....	Chapleau.....	Mar. 27.....	Furnishing duplex steam pumping engine.....	T. J. Godfrey, Town Clerk.
Ohio.....	Col'bus Heights	Mar. 28.....	Constructing water mains.....	H. H. Canfield, 300 Beckman Bldg., Cleveland, Village Clerk.
Man., Can.....	Winnipeg.....	Mar. 29, 11 a.m.....	Furnishing c. i. pipe for water works and sewer pipe required during present year.....	M. Paterson, Secy. Bd. Control.
Missouri.....	Kansas City.....	Mar. 30.....	Constructing self-contained, vertical, triple-expansion crank & fly-wheel pump, engine of 20 million gals. capac. in 24 hrs.	E. B. Harrington, Secy. B.F. & W.C.
Sask., Can.....	Saskatoon.....	Mar. 31, noon.....	Installing mechanical filtration plant.....	W. B. Neil, City Comr.
Pennsylvania...	West Telford.....	April 1.....	Constr. water works; approx. cost \$30,000.....	H. Z. Walpole, Secy. Water Co
Texas.....	Galveston.....	Apr. 3, noon.....	Installing 10,766 lin. ft. of water main.....	A. T. Dickey, City Engineer.
New York.....	Keesville.....	Apr. 5.....	Constructing reservoir, laying water pipe, etc.....	J. B. Mace, Pres. Bd. Water Comrs.
Sas., Can.....	Moose Jaw.....	Apr. 10, 8:30 p.m.....	Furn. and lay. about 29,700 lin. ft. c. i. water main; sep. bids..	W. F. Heal, City Clerk.
Maine.....	Ft. McKinley...	Apr. 15.....	Constructing chemical water softening plant.....	Capt. Jos. F. Gohn, Con. Q.M.U.S.A.
BRIDGES				
Nebraska.....	Benkelman.....	Mar. 20.....	Constructing wooden wagon bridge.....	Dund County Commissioners.
Indiana.....	Greenfield.....	Mar. 20, 10 a.m.....	Constructing four bridges.....	C. H. Troy, County Auditor.
Ohio.....	Cambridge.....	Mar. 21, noon.....	Building two stone piers and stone abutments for bridge...	W. D. Deselm, County Auditor.
Ohio.....	Coshocton.....	Mar. 21, 10 a.m.....	Constructing bridge; repairing and painting bridge.....	Frank Mowrey, County Auditor.
Ohio.....	Cleveland.....	Mar. 22, 11 a.m.....	Bridge and road work.....	John F. Goldenbogen, Clk. Comrs.
Ontario, Can...	Niagara Falls...	Mar. 23.....	Erecting six concrete bridges.....	Wm. Doran, Park Comr.
Ohio.....	Cincinnati.....	Mar. 24, noon.....	Constructing concrete bridge.....	Stanley Struble, Pres. Co. Comrs.
Virginia.....	Danville.....	Mar. 28, noon.....	Constructing reinforced conc. bridge about 1,000 ft. long with 20-ft. roadway.....	J. O. Magruder, City Engr.
New York.....	Fredonia.....	Apr. 1, 2 p.m.....	Constructing concrete arch over Candaway Creek.....	Frank H. Moir, Town Clerk.
Kansas.....	Hill City.....	Apr. 4, noon.....	Constructing bridge.....	Ben. S. Smith, Co. Clerk.
North Dakota...	Cando.....	Apr. 4, 1 p.m.....	Constructing 150 ft. more or less of concrete and steel bridges..	Frank Shanley, County Auditor.
LIGHTING AND POWER				
New York.....	Gloversville....	Mar. 21.....	Furnishing and operating for period of 5; also 10 years, about 132 electric arc street lights and about 194 incandescent street lights.....	Morrell Vrooman, City Engineer.
Iowa.....	Webster City....	Mar. 21.....	Constructing electric light and power plant.....	City Clerk.
Indiana.....	Columbia City....	Mar. 25.....	Furnishing machinery for electric light plant.....	City Clerk.
Alberta, Can...	Calgary.....	Mar. 22, noon.....	Furnishing one 1,500 KW. turbo-generator with condensor; three 1,000 KVA single transf. 12,000 to 2,300 volts with switch gear etc.....	W. D. Spense, City Clerk.
Kentucky.....	LaGrange.....	Apr. 1.....	Installing second-hand 65 H.P. gas engine and producer for soft coal; 45 kilowatt D. C. multipolar comp. 250 volt generator; also poles, overhead and underground wire, cross-arms etc..	J. C. Emmick, Manager.
Sask., Can.....	Rouleau.....	Apr. 4.....	Pumping machinery, electrical machinery, pole line, etc., producer gas plant, c. i. or steel water mains, valves etc.....	W. H. Stewart, City Secy.-Teras.
Sask., Can.....	Moose Jaw.....	Apr. 10, 8:30 p.m....	Furn. 2 electrically driven centrif. pumps and auto starters..	W. F. Heal City Clerk
FIRE EQUIPMENT				
Wisconsin.....	Racine.....	Mar. 21, 8 p.m.....	Furnishing 1,000 ft. of 2 1/2 in. double jacket cotton rubber lined hose guaranteed to withstand 400 pounds pressure.....	Leslie M. Fowler, City Clerk.
Washington....	Tacoma.....	Apr. 6, 3 p.m.....	One-third size steam Fire Engine.....	L. W. Roys, Comr. Public Safety.
New Jersey....	Princeton.....	July 5.....	Furn. auto pumping engine.....	E. M. Updike, Chm. F. & W. Com.
MISCELLANEOUS				
Massachusetts...	Boston.....	Mar. 17, noon.....	Erecting, and completing additions, extensions and improvements to bath houses.....	Richard M. Walsh, Chm. Bath Trus.
New York.....	New York.....	Mar. 17, noon.....	Furnishing carts with horses for disposing of street sweepings from piers and water front property, Boros, Manhattan, Bronx Brooklyn and Queens.....	Calvin Tomkins, Comr. of Docks.
Washington....	Spokane.....	Mar. 17, 2 p.m.....	Furnishing 5-passenger automobile.....	John Gifford, City Purchasing Agt.
California.....	Eureka.....	Mar. 18.....	Improving the jail.....	Geo. W. Cousins.
South Carolina.	Georgetown.....	Mar. 20.....	Erecting 2-story brick fire house.....	F. L. Sian, Chm.
Wisconsin.....	Burlington.....	Mar. 24, 2 p.m.....	Building reinforced concrete retaining wall around stand-pipe..	P. J. Hurtgen, Chm. B. P. Wks.
Massachusetts...	New Bedford....	Mar. 29, 3 p.m.....	Furnishing 57 sanitary drinking fountains in various schools..	Allen P. Keith, Secy. Com. Sup.
New York.....	Troy.....	Mar. 29.....	Erecting county jail.....	Rensselaer County Jail Comn.
Connecticut...	Waterbury.....	Apr. 5, 4 p.m.....	Altering building to conform to requirements of mod. fire sta..	Wm. H. Sanderland, City Clerk.

STREET IMPROVEMENTS

Demopolis, Ala.—City will lay about one-half mile of cement sidewalks along Maine st., Washington to Fulton st.—Jesse B. Hearin, Mayor.

Pomona, Cal.—Paving of Park ave., 2d st. to Garey ave., is being considered.

Sacramento, Cal.—Bids will be asked by Board of City Trustees for furnishing 12-ton roller of modern make.

Stockton, Cal.—San Joaquin County highway bonds to the amount of \$500,000 have been purchased by E. H. Rollins & Sons, San Francisco.

New London, Conn.—If Legislature grants authority to issue bonds city will lay granolithic walks 5 ft. wide over large section of city.—Geo. K. Crandall, City Surveyor.

Arcadia, Fla.—Council has ordered laying of concrete walks on ten principal streets.

Tampa, Fla.—Board of Public Works is considering purchase of three or four cars of oil for use on streets and three or four cars of brick.

Augusta, Ga.—Board of Public Works has ordered laying of additional mile of curbing in Third Ward.

Macon, Ga.—Bibb County will vote May 10 on \$100,000 bonds for road improvements and new roads.

Moscow, Ida.—City is considering election on paving number of streets.

Peoria, Ill.—City Engineer Van Deusen is preparing estimate for paving of East Court st. under direction of Board of Local Improvements.

Kendallville, Ind.—Council has passed resolution to pave North Main st.

Logansport, Ind.—Plans and specifications have been prepared by City Engineer Harry Thompson for paving North st.

Mt. Vernon, Ind.—County Council has appropriated \$20,000 for road and bridge construction in Posey County.

Princeton, Ind.—Council will order construction of several miles of concrete walks.

Vincennes, Ind.—Resolutions have been adopted for improving Short and Upper 11th sts.

Salina, Kan.—Council is considering paving of 9th st.

Lexington, Ky.—Board of Public Works has decided to advertise for bids separately as follows: Furnishing 13,000 tons of crushed stone and spreading same on the macadam streets of city; unloading, spreading and selling the stone delivered from city jail; sweeping and cleaning all the improved streets of the city; cleaning all macadam streets and public alleys twice a year; furnishing and spreading 170,000 gals. of Ragland oil on the macadam streets.

Baltimore, Md.—City will pave and repave

with improved pavements portions of eight streets.—B. T. Fendall, City Engineer.

Boston, Mass.—City is considering the construction of granolithic sidewalks on Washington st., West Roxbury, from Green to Walker Hill st., distance of one mile; also the paving of South st., Centre st. to Arbor Way, with brick, and granolithic sidewalks, distance of one-half mile.—Louis K. Rourke, Commissioner Public Works.

Dartmouth, Mass.—Town has voted \$3,500 to continue macadamizing of Chosen road, \$8,000 to resurface Panaran road and \$3,250 for improving other streets.

Dighton, Mass.—Town has voted to improve Center st. with macadam.

Dracut, Mass.—Town has voted to raise \$1,000 to construct macadamized road on Pleasant st.; also \$1,000 for building sidewalk on Lakeview ave.

Lakeville, Mass.—Town has appropriated \$2,500 to improve roads.

Marblehead, Mass.—Citizens have appropriated \$3,500 to build granolithic sidewalk at Causeway at Riverhead Beach, \$500 to construct sidewalks on Atlantic ave., also \$600 to cover Curtis st. drain.

New Bedford, Mass.—Board of Aldermen has voted to ask for bids on 15-ton steam road roller.

Oak Bluffs, Mass.—Town has voted \$2,000 for improvement of road along Lagoon road.

Crookston, Minn.—Plans are being prepared for paving 21,372 sq. yds. with Westrumite asphalt macadam.—J. E. Carroll, City Engineer.

Rolling Fork, Miss.—Sharkey County has voted \$50,000 bonds for road improvements.

St. Louis, Mo.—Board of Public Improvements has rejected all bids received for paving Delmar blvd. from Skinner road to city limits.

Kalispel, Mont.—Bids will at once be asked for proposed street paving; bitulithic pavement is favored.

Flemington, N. J.—Bill has been passed to allow Hunterdon County to increase amount it may spend for road construction; \$40,000 a year is now allowed, but work to cost more is planned.

Hackettstown, N. J.—Council will at once ask new bids for crushing and delivering stone for road work.

Long Branch, N. J.—Council will ask for bids for furnishing gravel for repairing streets by cubic yards f. o. b. Long Branch on approximate quantity of 100 carloads.—B. B. Newcomb, City Clerk.

Newark, N. J.—Board of Public Works will let forty-four separate paving contracts during year; Engineer Howell, of Street Department, has estimated cost at \$830,000.

Newark, N. J.—Senate has passed unanimously, in concurrence with House, Assemblyman Leveen's bill authorizing Newark to raise funds not exceeding \$1,000,000 for widening of Mechanic st.

Metuchen, N. J.—Street Committee will ask for bids for resurfacing Main st.

Perth Amboy, N. J.—Paving of Smith st. with asphalt block is being considered.

Sharpstown, N. J.—Citizens of Pilesgrove Township have petitioned Salem County Freeholders to build State road from the proposed Mannington and Woodstown State road to village of Sharpstown, distance one mile.

Trenton, N. J.—County Board of Freeholders is considering improvement of road extending from city to Lawrenceville and Princeton.

Westfield, N. J.—Town has \$9,000 available for repairs to roads.—J. A. Dennis, Mayor.

Binghamton, N. Y.—Plans for proposed strip of macadamized highway from Whitney Point to Glen Aubrey have been received by Clerk Asa L. Bonnell, of Board of Supervisors; plans provide for a road 5.30 miles in length; cost about \$60,000.

Canastota, N. Y.—Paving of Peterboro st. with either brick or bitulithic is being urged.

Herkimer, N. Y.—State Highway Commission has submitted figures showing cost of the German street pavement to be \$32,063.46.

Lenox, N. Y.—Town has voted \$4,490 for road improvements.

New York, N. Y.—City will pave 4th ave., 8th st. to 23d st., with granite cubes.

Pelham Manor, N. Y.—Citizens will vote on expenditure of \$13,000 for laying of 10,000 ft. of new sidewalk and also for repairing of several thousand ft. of old sidewalks.

Poughkeepsie, N. Y.—Plans and specifications will be prepared for paving with brick North Clinton st. and with macadam Mansion st.

Port Jervis, N. Y.—Bids will be asked in near future for paving estimated to cost \$30,000.—Theodore Ludlum, Superintendent Paving; Irving Righter, City Engineer.

Poughkeepsie, N. Y.—Council has ordered macadamizing of Hamersley ave., paving of Mill, Cannon and South Hamilton st. with vit. brick, and Washington st. with creosote wood block.

Syracuse, N. Y.—Plans for Skaneateles-Camillus county highway have been approved and appropriation for construction authorized by Board of Supervisors.—F. W. Starr, Division Engineer, State Highway Commission.

Utica, N. Y.—Board of Contract and Supply has rejected all bids received for pavements on seven streets.

Kings Mountain, N. C.—Kings Mountain Precinct, No. 4 Township, has been authorized to call election on \$25,000 bond issue for road construction. J. M. Patterson, Highway Commissioner, is interested.

Barberton, O.—Street Committee has recommended paving of 3d st.

Bucyrus, O.—The Road Commissioners of Road District No. 1 in Crawford County are planning improvement of several highways, at estimated cost of \$15,000.—G. F. Ackermann, County Auditor.

Hamden, O.—The State Highway Department and Commissioners of Vinton County are considering construction of pike from McArthur to Hamden, distance 7 miles.—S. R. Walker, County Surveyor.

Hamilton, O.—Improvement of Fairgrove ave. is being considered; cost is estimated by Engineer F. E. Weaver at \$3,606.

Marletta, O.—City Engineer E. F. Oates has prepared plans and estimates for rais-

ing Front, Putnam and Greene sts. to a higher level; work includes 67,000 cu. yds. earth fill, \$13,000; 26,700 sq. yds. repaving, \$40,000; 9,950 lin. ft. curb reset, \$2,500; relaying water mains, including new 10-in. main on Front st., \$1,700; concrete retaining walls, \$5,400; storm water sewers and street inlets, \$1,000; raising sanitary sewer openings to grade, \$500; relaying sidewalks, \$9,000; engineering and contingencies, \$7,300; total cost, \$80,400.

Junction City, Ore.—Council is considering laying of concrete paving on main streets in spring.

Portland, Ore.—Street Committee has rejected bid of Montague-O'Reilly Co. for paving East Morrison st. with wood blocks; also bids of Oregon Hassam Paving Co. for paving three streets; bids will be read-verted.

St. Johns, Ore.—City is considering paving Jersey st. for 13 blocks with Westrumite; cost about \$25,000.

Altoona, Pa.—Board of Public Works will ask bids for paving at cost of \$75,000.

Hickory, Pa.—Road Supervisors of Mount Pleasant Township will build additional brick roads this summer.

Philadelphia, Pa.—If parking plans of Comprehensive Plans Committee are realized city will ultimately have 133 miles of park drives, exclusive of those in Fairmount Park, connecting numerous parks of city.

Pittsburg, Pa.—City is considering widening of Smithfield st. bridge.

Wilkes Barre, Pa.—Permission for improvement of the road between this city and Harvey's Lake will be asked of next Grand Jury by County Commissioners.

Providence, R. I.—Council has passed resolution appropriating \$80,000 for widening Eddy st.

Latta, S. C.—Bids will be received for paving sidewalks; either per sq. yd., contractor furnish material, or per sq. yd., town to furnish sand, cement and rock.

Chattanooga, Tenn.—Board of Aldermen has voted \$45,000 bonds for paving purposes.

Greenfield, Tenn.—City will petition Legislature for authority to issue \$30,000 of bonds for street improvement.—J. N. Ray, Mayor.

Knoxville, Tenn.—City will have at least three improvement districts to pave this year.

Angleton, Tex.—Brazoria County will vote March 28 on \$150,000 bonds for road improvements in District No. 1.

Austin, Tex.—Council has decided to pave 4th st., Colorado to Trinity st.; bids will soon be asked.

El Paso, Tex.—City Engineer F. H. Todd has estimated cost of paving East San Antonio st. with bitulithic at \$22,511.62.

Luling, Tex.—Election on \$50,000 road bonds is being considered.

Price, Tex.—City will at once put into effect ordinance allowing levy of taxes for street and sidewalk improvements.

Salt Lake City, Utah.—Senate has passed bill providing for the issuance and disposal of bonds in sum of \$260,000 or \$10,000 for each county excepting Salt Lake, for building of roads and bridges in the State, and apportionment of the money to various counties in State.

St. Albans, Vt.—Citizens have voted \$15,000 for street improvements.

Bristol, Va.—Building of macadamized highways out of city into Washington County, will begin this spring.

Newport News, Va.—City Engineer Pearce has reported that it will cost \$6,459 to put crushed rock on all unpaved streets in city where curbing and guttering have been laid.

Hillyard, Wash.—Paving of Market st. for distance of 16 blocks is being considered.

Seattle, Wash.—Bids have been rejected for paving McClelland st.; Independent Asphalt Paving Co., low bidder, \$28,155.30.

Seattle, Wash.—Board of Public Works has received following estimates for improvements: Lucille st., plank roadway, \$3,370; Seattle blvd., wood walks, \$9,100; Brandon st., grading and curbing, \$51,200.

Spokane, Wash.—City will pave Wall st. with asphalt macadam pavement from Garland to city limits.

Beloit, Wis.—Council has ordered brick pavement in west side fountain square.

Milwaukee, Wis.—Asphalt mixing plant costing about \$10,000 and portable asphalt repair plant costing about \$3,500 are desired by Department of Public Works.

Medicine Hat, Alta, Can.—Council has passed by-laws to provide for the following street improvements: Concrete sidewalks, \$83,500; curbs and gutters, \$17,500; sidewalks, \$5,500; sewers, \$51,500.

New Westminster, B. C., Can.—Plans and specifications are being prepared for large amount of proposed paving.

St. Lambert, Que., Can.—Citizens have voted \$225,000 bonds for street improvements.

CONTRACTS AWARDED

Birmingham, Ala.—To Southern Bitulithic Co., Nashville, Tenn., for paving Ave. F from 18th to 27th st. with bitulithic, \$45,000.

Santa Monica, Cal.—Grading, paving, constructing cement curbs, sidewalks and catch basins in Vicente Terrace Tract, to Fred H. Stout, 4246 S. Grand ave., Los Angeles, \$7,065.

Greensburg, Ind.—Paving Main st. with brick, to Daniels, Lyst & Douglas, Anderson, \$70,600.

Indianapolis, Ind.—Contract for not less than 600 tons nor more than 750 tons of asphalt for municipal asphalt repair plant, to California Asphaltum Sales Agency, by Board of Public Works, at \$24 per ton; contract is for Maltha California asphalt.

Lapel, Ind.—Building cement walks along Pendleton ave., to A. W. Doan, \$5,812.

Louisville, Ky.—Laying 200,000 vit. blocks, to Peebles Paving Block Co., Portsmouth, O., \$15 per M; laying unlimited number of vit. brick, to Kentucky Vit-rified Brick Co., city, \$12 per M.

Fort Andrews, Mass.—Constructing roads, walks, gutters, catch basins and drain, to Thomas Fitzgibbons, Beverly.

Haverhill, Mass.—Supplying cement for street department use during season, to Haverhill Cement Stone Co., \$1.49 per bbl.

New Bedford, Mass.—Block paving on Purchase st., to Simpson Corporation, 97½c. per sq. yd.; city will provide granite block.

St. Louis, Mo.—Paving: To G. Eyermann & Bro., 1216 S. Grand ave., a portion of Fassen st. with brick, \$6,080; to Ruecking Construction Co., Marine ave. and Gasconde st., portions of Liberty and S. Dakota sts. with brick, \$2,545 and \$3,970, respectively; to Granite Bituminous Paving Co., Pierce Bldg., Destrehan st., from 19th st. to Florissant ave., with bitulithic, \$11,116, and 13th st., from Cass ave. to 11th st., with bitulithic, \$68,589; to Perkins Bros. Construction Co., 3237 Carter ave., Destrehan st., from 2d to 11th sts., with brick, \$6,520; to Skrainka Construction Co., Security Bldg., a portion of Clarence ave. with brick, \$9,394; to John F. McMahon, Wainwright Bldg., with brick, Leffingwell ave., Angelica st., Destrehan ave. from Hall to 2d st. and 19th st. from Branch to Salisbury st., at total of \$42,327; to G. A. Heman, with asphalt, portions of 16th and 17th sts., 23d st. from O'Fallon to Madison st., and 19th st. from Washington ave. to Carr st., at total cost of \$100,320; to Harry F. Heman, 721 Olive st., 19th st. from Carr to Madison st., with brick, \$17,566, and 23d st. from N. Market to Hebert st., with brick, \$23,384; to Parker-Washington Co., 4500 Duncan ave., with wood blocks on several portions of 18th st., total cost \$54,691.

Jersey City, N. J.—Improving 14th st., to Nolan & Hornung, \$26,058.

Newark, N. J.—Repaving asphalt streets in the city for years 1911, 1912 and 1913: To Standard Bitulithic Co., \$1.15 per sq. yd. for resurfacing and \$1.19 per sq. yd. for repairs; furnishing broken stone for road repairs for the years 1911, 1912 and 1913, to Frederick Van Keuren, Harrison, \$2.05 per cu. yd.

New York, N. Y.—Flagging, etc., Muscota st., to Ames Transfer Co., Kingsbridge ave., Bronx, \$41,638; repairing asphalt block pavement, to Harlem Contracting Co., 2 Rector st., \$43,235.

Alva, Okla.—To Rackliffe-Gibson Construction Co., St. Joseph, Mo., for 23,000 sq. yds. Hassam pavement.

Muskogee, Okla.—To Hemans Construction Co. for street improvement work in District No. 104 which embraces certain blocks on Columbus ave., Galveston and East Side blvd., \$27,734.42; Trinidad Lake asphalt will be used.

Carbondale, Pa.—Grading Powderly road, to John Booth, 50c. per cu. yd. for removal and filling in with dirt, \$2.50 for rock excavating.

Pittsburg, Pa.—Furnishing cement, to Universal Portland Cement Co., \$1.41 by the barrel, or \$1.01 by sack; the Standard Bitulithic Co. will resurface Hulton road with Warrenite, 37c. per sq. yd.; Verona road will be resurfaced by the Pittsburg Amisite Co., 85c. per sq. yd.; ballast, to the Clydesdale Stone Co., Morrison & Co., Booth & Flinn and the Pope Stone and Brick Co.; delivering ballast, to James Creese, Edward Vero, Seebolt & Skiles, H. F. Caley, Hodel & Brown, Wolf & Thompson and W. S. Bedall, at prices depending on length of haul.

Dallas, Tex.—Paving Main st., Ervay st. to Houston and Texas Railroad, to Texas Bitulithic Paving Co.

Lynchburg, Va.—Laying tar macadam on Wise st., to S. B. Bennington, city, \$16,517.30; other bidders: Long & Miller, New York, \$17,211.50; J. R. Ford & Co., city, \$17,952.80; J. L. Meem Engineering Co., city, \$21,861; paving three streets with bit-

ulithic, to Atlantic Bitulithic Co., Richmond, \$30,000.

Norfolk, Va.—Paving Bank st., Freemason and Queen sts., with wood block, to United States Wood Preserving Co., New York, for which William A. Young is Norfolk agent, \$2.85 per sq. yd.

Roanoke, Va.—To T. Wright & Co., J. T. Muddelman, C. Markley and Vaughan Construction Co. for the construction of macadam streets and concrete curb and gutters throughout city at total cost of \$180,000.

Spokane, Wash.—Paving Hamilton st. with asphalt, to Barber Asphalt Paving Co., \$65,448.

Ghent, W. Va.—Laying about 8,500 sq. yds. of vit. brick on Olney road and Boteourt st., to Louis S. Lawson, \$3 per sq. yd.

BIDS RECEIVED

Boston, Mass.—Furnishing 400,000 gals. of emulsion oil and 400,000 gals. of emulsified road oil, Standard Oil Co., 26 Broadway, New York, 4c. per gal., 4.95c. per gal.; Texas Oil Co., 4.9c.; Gulf Refining Co., 3 3/4c., 4.75c.

Mt. Vernon, N. Y.—Regulating and grading Oakley ave: James Piro, new curb 70c., old curb 35c., brick pavement \$2.34, brick pavement relaid 10c., new flag walks 68c.; Louis Petrillo, new curb 80c., old curb 35c., brick pavement \$2.35, brick pavement relaid 25c., new flag walks 60c., old flag walks 10c.; James Garofano, new curb 69c., old curb 35c., brick pavement \$2.53, brick pavement relaid 15c., new flag 67c., old flag 15c.; Charles Mattolla, new curb 80c., old curb 35c., brick pavement \$2.45, brick pavement relaid 25c., new flag walks 65c., old flag walks 12c.; Frank Nordone, new curb 65c., old curb 30c., brick pavement \$2.25, brick pavement relaid 10c., new flag 67c., old flag walks 9c.; Sabino Guarino, new curb 80c., old curb 30c., brick pavement \$2.35, brick pavement relaid 35c., new flag walks 70c., old flag walks 7c.; J. A. Sillery, new curb 70c., old curb 70c., brick pavement \$2.75, brick pavement relaid 30c., new flag walks 65c., old flag walks relaid 10c. Treating of trees along city's streets: Inter-State Tree Treating Co., 85c. per tree; N. L. Rich, Stamford, Conn., \$1.35 each; R. F. Planta, 72c. each. Regulating, grading and paving Villa st.: Charles Mattolla, new curb 90c., old curb 25c., old cross walks \$1.25, brick pavement \$2.30, brick pavement relaid 50c., macadam 97c., old sidewalks 15c., brick pavement on a 6-in. foundation \$2.30; James Ciaca, new curb 75c., old curb 25c., old cross walks 25c., brick pavt. 25c., macadam \$1.05, old sidewalk \$1.04, brick pavt. on a 6-in. foundation \$2.40; Louis Petrillo, new curb 80c., old curb 35c., old cross walks \$1, brick pavement \$2.30, brick pavements relaid \$1; macadam \$1.13, old sidewalks 10c., brick pavement on a 6-in. foundation \$2.35; Jas. Garofano, new curb 70c., old curb 20c., old cross walks 50c., brick pavements \$2.30, brick pavements relaid 15c., macadam 98c., old sidewalks 15c., brick pavements on a 6-in. foundation \$2.30; J. A. Sillery, new curb \$1, old curb \$1, old cross walks 25c., brick pavement \$2.25, brick pavement relaid 12c., macadam \$1.15, old sidewalks 10c., brick pavements on a 6-in. foundation \$2.50; Frank Nordone, new curb 60c., old curb 26c., old cross walks 25c., brick pavements \$2.19, brick pavements relaid 1c., macadam \$1.15, old sidewalks 9c., brick pavements on a 6-in. foundation \$2.30; Sabino Guarino, new curb 80c., old curb 25c., old cross walks 10c., brick pavements \$2.20, brick pavements relaid 10c., macadam \$1.11, old sidewalks 10c., brick pavement on a 6-in. foundation \$2.36.

New York, N. Y.—Repaving with improved granite block pavement on concrete foundation 4th ave. from 8th to 23d st., Republic Construction Co., 11 Broadway, lowest bidder, as follows: 20,290 sq. yds. improved granite block pavement, with paving cement joints, except the railroad area, \$3.55; 1,900 sq. yds. improved granite block pavement with paving cement joints, within the railroad area, no guarantee, \$3.55; 3,860 cu. yds. Portland cement concrete, 1c.; 4,720 sq. ft. new granite bridgestone, furnished and laid, 70c.; 1,350 lin. ft. header stone, 30c.; 1,000 lin. ft. new bluestone curbing, 70c.; 200 lin. ft. old bluestone curbing, reset, 70c.; total, \$83,362; 26th st. from 7th ave. to 10th ave., Thos. Tarry, 409 E. 69th st., lowest bidder, as follows: 8,210 sq. yds. improved granite block pavement with paving cement joints, \$2.85; 1,620 cu. yds. Portland cement concrete, 4c.; 380 sq. ft. new granite bridgestone, 78c.; 90 lin. ft. header stone, 1c.; 4,630 lin. ft. new bluestone curbing, 60c.; 350 lin. ft. old bluestone curbing, reset, 21c.; total, \$33,444.

Utica, N. Y.—Street paving: Mary st.: Farber Asphalt Paving Co., asphalt pavement with sandstone curb \$6,862.40, with certified stone curb \$6,442.40; Warner-Quinlan Asphalt Co., Syracuse, asphalt with sandstone curb \$6,798.90, artificial

curb \$6,546.90; Hickory st., Barber Asphalt Paving Co., asphalt with sandstone curb \$10,477.90, artificial \$9,847.90; Warner-Quinlan Co., asphalt, sandstone curb \$10,372, artificial \$9,812; J. W. Johnston & Son, metropolitan block, sandstone curb \$11,571, artificial \$10,821; Mack on Corning brick, sandstone curb \$11,215, artificial \$10,465; Knox st., Barber Asphalt Paving Co., asphalt, sandstone curb \$1,942.60, artificial \$1,822.10; Warner-Quinlan Co., asphalt, sandstone curb \$1,897, artificial \$1,823.50; Young pl., Barber Asphalt Paving Co., asphalt, sandstone curb, \$2,756.90, artificial \$2,579.40; Warner-Quinlan Co., asphalt, sandstone curb \$2,701.50, artificial \$2,589; Humbert ave., Barber Asphalt Paving Co., asphalt, sandstone curb \$5,920.30, artificial \$5,542.80; Warner-Quinlan Co., asphalt, sandstone curb \$5,879, artificial \$5,646.50; Kirkland st., Barber Asphalt Paving Co., asphalt, sandstone curb \$12,297.70, artificial \$11,547.70; Warner-Quinlan Co., asphalt, sandstone curb \$11,897.50, artificial \$11,435.50; North Genesee st., Barber Asphalt Paving Co., asphalt \$20,807.40, Mack brick pavement \$26,967.40, Hammond sandstone pavement \$35,318.40; Warner-Quinlan Co., asphalt, \$19,082.40; J. W. Johnston & Son, Mack or Corning brick, Medina curb, \$21,897.20, Hammond curb \$21,669.20, metropolitan block, Medina curb \$22,597.20, Hammond curb \$22,369.20, Hammond stone pavement and curb \$29,033.60, Medina stone pavement and curb \$31,038.20; N. D. Peters, Mack brick pavement \$22,394.60, Hammond stone pavement \$29,558.60; J. R. Baxter, Jr., Shawmut brick pavement \$21,318.80, Hammond \$28,638.40; H. W. Roberts & Co., Mack, Clearfield or Corning brick pavement \$23,067, Medina stone \$31,062.20.

Utica, N. Y.—Constructing highways around Delta reservoir as follows, (a) Cunningham & Woodward Co., Hudson Falls, N. Y., (b) Jas. Anderson, Box 631, Caledonia, N. Y., (c) Theo. C. Hailes, Jr., 86 State st., Albany: Clearing, lump sum, (a) \$500, (b) \$220, (c) \$250; 57,900 cu. yds. all excav., (a) 54c., (b) 67c., (c) 44c.; 44,800 cu. yds. forming embankment, (a) 12c., (b) 18c., (c) 12c.; 380 cu. yds. 2d class concrete, (a) \$8, (b) \$7.50, (c) \$8; 7,400 lbs. metal reinforcement, (a) 6c., (b) 4c., (c) 4c.; 1,100 sq. yds. cobblestone paving, (a) \$1.50, (b) \$1, (c) 85c.; 300 cu. yds. 4th class rip-rap, (a) \$2.50, (b) \$2.60, (c) \$2; 10,300 lin. ft. wooden fence, (a) 30c., (b) 26c., (c) 23c.; underdrain, laid, including trenching and back filling, (a) 30c., (b) 30c., (c) 35c.; 12 M. ft. yellow pine sawed lumber in bridge floor, (a) \$40, (b) \$60, (c) \$60; taking down, moving, re-erecting, cleaning and painting bridge, lump sum, (a) \$990, (b) \$1,200, (c) \$1,625; totals, (a) \$47,632, (b) \$51,037, (c) \$40,834.

Elizabeth City, N. C.—Street paving: F. J. McGuire, Norfolk, Va., sand foundation, Mack block \$1.71, Peabees block \$1.63; Baltimore block \$1.42 1/2; concrete foundation, Mack block \$2.31, Peabees block \$2.17, Baltimore block \$2, asphalt macadam \$1.35, tarvia macadam \$1.20, asphalt block \$2.10; J. L. Robertson, Baltimore, Md., sheet asphalt \$1.50; Atlantic Bitulithic Co., Richmond, Va., bitulithic \$2.06, double bond \$1.55; United States Wood Preserving Co., New York, wood block \$2.25, wood block \$2.31; Lewis Lawson, Norfolk, Va., sand foundation, Baltimore block \$1.45, Carlisle block \$1.57, concrete foundation, Baltimore block \$2.03, Carlisle block \$2.17, Mack block \$2.25, Peabees block \$2.17; concrete block, No. 1 \$2, No. 2 \$1.60, No. 3 \$1.35, asphalt macadam \$1.39, tarvia macadam \$1.24, asphalt block \$2; Peters Bros. Paving Co., Chicago, Ill., sheet asphalt, Obispo \$1.62, sheet asphalt \$1.59, sheet asphalt \$1.51, 1 1/2 in. W. S., Petrico concrete \$1.58, Petrico gravel \$1.40; Warner-Quinlan Asphalt Co., Syracuse, N. Y., sheet asphalt, California \$1.59, sheet asphalt Trinidad \$1.63, sheet asphalt Bermuda \$1.66, asphalt macadam, California \$1.24, asphalt macadam Trinidad \$1.24, asphalt macadam Bermudas \$1.29.

Lorain, O.—Sidewalk contract, H. A. Schallon, city, lowest bidder, \$11,557.65; detail bid was as follows: new stone, 2-in. stone laid with base, about 61,000 sq. ft., 9 3/4c. per sq. ft.; 3-in. stone, 100 sq. ft., 13 3/4c.; 4-in. stone, 100 sq. ft., 17c.; 5-in., 20 sq. ft., 22c.; 6-in., 6,100 sq. ft., 25c.; relaying, 2-in. stone, including base, 50,000 sq. ft., 3 3/4c.; 3-in., 2,000 sq. ft., 3 3/4c.; 4-in., 400 sq. ft., 4c.; 5-in., 20 sq. ft., 5c.; 6-in., 6,700 sq. ft., 6c.; new concrete wall, 4-in., laid in base, 1,000 sq. ft., 16c.; 5-in., 1,000 sq. ft., 17c.; vit. pipe, 8-in. laid, 100 lin. ft., 16c.; 10-in., 100 lin. ft., 22c.; 12-in., 100 lin. ft., 30c.; 15-in., 50 lin. ft., 37c.; 18-in., 50 lin. ft., 50c.; 24-in., 20 lin. ft., 80c.; grading, 3,000 cu. yds., 40c.; extra planning, 45c.; extra labor, 22 1/2c.; totals of other bidders: A. Graepner, city, \$11,635.20; H. N. Oberlander, Bucyrus, \$11,912.22; M. L. Jackson, city, \$11,942.75; Aaron Best, city, \$12,032.80, and McHugh Bros., Springfield, \$19,524.41.

Dallas, Tex.—Paving with asphalted macadam Jefferson st., Tenth to Tyler, Oak Cliff; two bids were opened, as follows: Standard Engineering & Construction Company, \$1.26 per sq. yd. of surface, without maintenance, including subgrade excavation, with \$1.00 per cu. yd. for rock excavation above grade; John C. Underwood, \$1.36 per sq. yd.

Kenosha, Wis.—Paving Lake ave., (a) asphalt macadam, (b) brick, (c) sheet asphalt, (d) wood block: Chris Petersen, (a) \$30,000, (b) \$31,700, (c) \$30,860, (d) \$43,460; White Construction Co., Milwaukee, (a) \$29,288, (c) \$31,528; John Brigan, Green Bay, (a) \$33,148, (d) \$42,528; C. P. Flatley, Green Bay, (b) \$34,374; Western Improvement Co., Racine, (a) \$32,384, (b) \$32,524, (c) \$33,644, (d) \$40,644; McCugo Bullock Co., Waukegan, Ill., (b) \$31,685, (d) \$39,245; Kelley Co., Chicago, Ill., (a) \$30,589, (c) \$31,429.

Seattle, Wash.—North half of Grand blvd. from 15th ave. W. to 20th ave. W., plank-ing, Donaldson & Johnson, 3926 Aurora ave., \$14,889.66; Rufus Buck, \$15,324.68; N. D. Johnson, \$15,806.80; 6th ave. S. et al., asphalt top, Independent Asphalt Paving Co., \$32,010; Barber Asphalt Paving Co., 1144 Henry Bldg., \$30,990.

SEWERAGE

Berkeley, Cal.—Citizens have voted \$250,000 bonds for installation of storm sewers.

Calxico, Cal.—Bids are being received for construction of sewer system requiring 1,335 ft. of 15-in., 2,281 ft. of 17-in., 1,256 ft. 10-in., 15,271 ft. 8-in. and 9,340 ft. of 6-in. sewer, two concrete settling tanks, manholes, etc.—J. B. Hoffman, City Clerk.

Los Angeles, Cal.—Streets and Boulevard Committee of Council has decided to recommend immediate repairing of the Sacatella storm drain, Western ave. to Wilton pl.; cost about \$3,500.

San Bernardino, Cal.—Bids will soon be asked for constructing vit. pipe sewers in Second, B and other streets.

Denver, Col.—Board of Public Works will soon order construction of lateral sanitary sewers in portion of Subdistrict No. 3; cost about \$141,246.

Springfield, Ill.—Sewerage system will be installed in near future.—H. Lang Mack, Village President.

Mt. Vernon, Ind.—City Engineer G. W. Sarlis is preparing plans for sewers for eastern section of city; cost about \$5,000.

Newcastle, Ind.—Council has obtained services of John H. Petri, Marion, to draw plans and specifications for arched sewer to carry stream flowing through center of city and known as Bowery Brook; the work will cost not less than \$60,000.

Mansfield, Mass.—Town has voted to adopt enabling act of Legislature whereby it may build system of sewerage.

Marion, Mass.—Town has appropriated \$3,000 to build sewer pumping station.—Geo. F. Richards and H. C. Luce, Commissioners.

Duluth, Minn.—Construction of sanitary sewer in Lake ave., distance over two miles, is being considered.

Jersey City, N. J.—Citizens will vote on \$75,000 bonds to improve drainage and water system.

New Brunswick, N. J.—Advisory Sewage Disposal Commission appointed by former Mayor W. E. Florance has recommended erection of three sewage disposal plants at estimated cost of \$105,000, exclusive of cost of the land upon which plants are to be erected, for treating sewage of the city by the chlorine process, bonds to be issued for work.

Ocean City, N. J.—Citizens will vote April 25 on \$75,000 bonds, to be used principally in providing surface water drainage.

Paterson, N. J.—Board of Finance has decided on \$27,550 appropriation to enable Board of Public Works to construct proposed sewers.

Trenton, N. J.—Consulting Engineer Rudolph Hering, 170 Broadway, New York City, will prepare plans for construction of proposed sewage disposal plant to cost from \$350,000 to \$500,000.

Frankfort, N. Y.—Vrooman & Perry, Gloversville and Canajoharie, are preparing revised plans for sewer system and sewage disposal plant.

Scarsdale, N. Y.—Survey is being made for sewer system to benefit southern end of county seat and town.

Black Mountain, N. C.—Citizens will vote on \$15,000 bonds for construction of sewerage system and water works.

Bowling Green, O.—Council has decided to construct lateral sewer in South Enterprise st.

Ironton, O.—Council has decided to issue bonds for construction of sewers in about eight streets and alleys.

Kennedy Heights, O.—Council has passed ordinance providing for construction of sewers in District 1; also authorized Engineer Jas. A. Stewart, Traction Bldg., Cin-

cinnati, to complete plans for sewers in Districts 2 and 3; cost of each sewer about \$23,000.

Newport, Ore.—Louis C. Kelsey, Selling Bldg., Portland, Ore., has been engaged as Consulting Engineer in the designing and construction of sanitary sewerage system.—F. B. Davis, City Engineer.

Lebanon, Pa.—Council has sold \$110,000 sewer plant bond issue to Graham & Co., Philadelphia.

Providence, R. I.—Committee on Sewers has presented following resolutions ordering sewers to be constructed; Elk st., \$37,261.48; Union ave., Laurel Hill ave. to Pocasset ave., and What Cheer ave., Laurell Hill ave. to Pocasset ave., \$8,179.27; President and Cole aves., \$3,353, assessments, \$1,952; Geneva and Powdermill sts., \$1,185.59; Tell st. and Atwell's ave., Harris ave. to new sewer, Kinsley ave. extension, \$1,254.46; Pocasset ave., \$9,313.19; 10th st., \$2,767.44; Langham road, Ivy st. to Mope st., \$2,612.88.

Honea Path, S. C.—Council has adopted ordinance providing for issuance of \$25,000 of bonds for construction of sewer system.

Aberdeen, S. D.—Benetzette Williams, Chicago, Ill., has been selected as Consulting Engineer to work with R. B. Easton, City Engineer, in construction of the \$200,000 worth of sewer extension and sewage disposal plant, and W. P. Mason, New York, N. Y., a bacteriologist, will also be employed to assist in work.

Maryville, Tenn.—City has petitioned Legislature for authority to issue \$100,000 of bonds for construction of sewerage system and water works.

Montross, Va.—Citizens have voted \$50,000 bonds to improve sewer and water system.

Milwaukee, Wis.—Department of Public Works is planning to build \$50,000 relief sewer in Thirteenth Ward.

CONTRACTS AWARDED

Colorado Springs, Col.—Construction of sewers in Storm Sewer District No. 1, to the Westcott-Doan Co., Denver, about \$31,000.—T. L. Waggener, City Engineer.

Washington, D. C.—Constructing sewers, to Warren F. Brenizer Construction Co., Washington, as follows: Sewers in the vicinity of Potomac Heights, \$7,787; Georgia ave. trunk sewer, \$5,958.—Asa E. Phillips, Superintendent Sewer Department.

Belvidere, Ill.—Constructing sewers, to Schuyler Vandewalker, about \$3,000.

Bement, Ill.—Constructing system of storm sewers and also outflow drain, to Arthur Bert, Decatur, \$22,145; other bidders: Henry Rees, Quincy, \$25,200; Henning Vineyard Co., Evansville, Ind., \$22,729; R. E. Goodwin & Jno. W. Ryan, Springfield, \$22,318; Samuel F. Ferguson, Danville, \$22,236.

New Bedford, Mass.—Supplying sewer pipe for year, to Chas. Warner Co.

Niagara Falls, N. Y.—Building sewers in South ave., to John Rinaldo, 20 days, \$1,792.84; other bidders: Reach, Morello & Co., 15 working days, \$2,139; Cosano & Dower, 25 working days, \$1,883.50; William Ruffan, 25 working days, \$2,126.10; Antonio Fiorilla, 25 days, \$2,074.80; Nick Nolfe, 25 days, \$2,014.90.

Hamilton, O.—Constructing sanitary sewers on 2d st. alley and 2d st. to Black for \$1,150.35 and on F st., Park ave. to Ross st., for \$985.40, to Frank J. Davis.

Clinton, Okla.—Construction of sewers, to J. W. Rooks, McAlester, at the following bid: 27.84 ft. 8-in. No. 1 vit. pipe, 28c.; trenching and refilling, 25.274 ft. 6 to 18 ft. deep, 18 to 49c.; 26,173 ft. pipe laying, including cement, etc., 6c.; 23 standard manholes, 7 ft. and under, 35c.; 4 extra for each drop to manhole, \$10; 68 extra for each additional foot of manhole, \$5; 39 combined flush tanks and manhole, \$100; 22 lamp-holes, 7 ft. and under, complete, \$4; 101 deep-cut house connections, \$4; 9,470 ft. galvanized ¾-in. pipe, laid, 20c.; 29 taps off water main, \$4; total, \$23,781; other bidders: Hunter & Hunter, Pools Valley, \$30,555; E. M. Eby, Wichita, Kan., \$31,614; Stone Construction Co., Clinton, \$31,262; Connelly Construction Co., El Reno, \$34,206.

Stoughton, Wis.—Constructing complete sewer system, to E. R. Harding Co., Racine, \$69,999; work includes 13½ miles of sewer, varying from 6-in. to 18-in. pipe, and a septic tank 9x28x100 ft.—L. C. Currier, City Clerk.

BIDS RECEIVED

Long Beach, Cal.—Sewer construction in 2d and other streets, Peter Grbovach, Los Angeles, \$7,900; S. Zarubica, Los Angeles, \$7,889; Frank H. Thomas, city, \$10,963; White & Gaskill, city, \$15,953.

Los Angeles, Cal.—Building sewer in Savannah st. Krist Radich, \$27,443; W. N. Hendricks, \$29,500; J. Zarubica, \$32,688; R. N. Nikcevic, \$32,915; John Balch, \$31,000;

Geo. A. Rogers, \$26,873; Peter Grbovach, \$33,990; Geo. Wujacich & Co., \$33,207; M. S. Cummings, \$47,753; Joe Chutuk, \$29,420.

Rock Island, Ill.—Installing west section of Seventh Ward sewer system, P. F. Trenkenschuh, city, \$60,429; Tri-City Construction Co., \$62,565; the E. R. Harding Co., \$69,000; the D. E. Keeler Co., Davenport, \$55,697.

Sigourney, Ia.—Detail bid of Bash & Gray, Joplin, Mo., successful bidders for constructing proposed sanitary sewers: 36,645 lin. ft. 8-in. pipe, 48c.; 5,351 lin. ft. 10-in., 52c.; 342 lin. ft. 12-in., 60c.; 100 lin. ft. 10-in., less than 4 ft. deep, 49c.; 407 lin. ft. 10-in., 4 to 6 ft. deep, 49c.; 247 lin. ft. 10-in., 6 to 8 ft. deep, 49c.; 153 lin. ft. 10-in., 8 to 10 ft. deep, 59c.; 216 lin. ft. 10-in., 10 to 12 ft. deep, 59c.; 146 lin. ft. 10-in., 12 to 14 ft. deep, 59c.; 50 lin. ft. 10-in., 14 to 16 ft. deep, 69c.; 44 lin. ft. 12-in., less than 4 ft. deep, 56c.; 100 lin. ft. 12-in., 4 to 6 ft. deep, 56c.; 883 lin. ft. 12-in., 6 to 8 ft. deep, 66c.; 474 lin. ft. 12-in., 8 to 10 ft. deep, 66c.; 229 lin. ft. 12-in., 10 to 12 ft. deep, 66c.; 120 lin. ft. 12-in., 12 to 14 ft. deep, 76c.; 367 lin. ft. 15-in., less than 4 ft. deep, 53c.; 853 lin. ft. 15-in., 4 to 6 ft. deep, 63c.; 905 lin. ft. 15-in., 6 to 8 ft. deep, 78c.; 648 lin. ft. 15-in., 8 to 10 ft. deep, 95c.; 544 lin. ft. 15-in., 10 to 12 ft. deep, 95c.; 483 lin. ft. 15-in., 12 to 14 ft. deep, 95c.; 130 lin. ft. 15-in., 14 to 16 ft. deep, \$1.25; 24 lin. ft. 10-in. c.-i. pipe, \$1.75; 42 brick pipes, \$10; 41 flush tanks, \$60; 8 lamp-holes, \$4; 104 regular manholes, \$33; 7 drop manholes, \$35; 1 septic tank, West plant, \$2,400; 1 septic tank, East plant, \$2,500; 1 septic tank, South plant, \$300; 1 set of filters, West plant, \$1,200; 1 set filters, East plant, \$1,200; 1 filter, South plant, \$200; total, \$39,741.

Baltimore, Md.—Sanitary Contract No. 62, Pratt st. trunk sewer, and Sanitary Contract No. 63, lateral sewers in District 15; Sanitary District No. 62, McCay Engineering Co., 9 East Lexington st., \$2,752; John Muller, 120 Law Bldg., \$85,117; W. H. & C. F. Thompson, \$92,765; Ryan & Reilly, 405 Coleman Bldg., Philadelphia, Pa., \$95,036; B. F. Sweeten & Sons, 820 Sharp st., \$107,427; the Whiting-Middleton Construction Co., \$15,585; Sanitary Contract No. 63, William McCarthy & Co., \$75,187; M. J. Beach, \$79,890; B. F. Sweeten & Sons, 820 Sharp st., \$95,524; David M. Andrew Co., \$96,804; W. H. & C. F. Thompson, 627 Law Bldg., \$100,654; the Whiting-Middleton Construction Co., \$108,680.

Niagara Falls, N. Y.—Building sewers: Lafayette ave., Reach, Morello & Co., 30 working days, \$5,781; Cosano & Dower, 50 working days, \$5,389.75; W. A. Shepard & Co., 40 working days, \$5,755.25; William Ruffan, 150 working days, \$5,117.50; Antonio Fiorilla, 25 working days, \$4,328.30; Nick Nolfe, 90 working days, \$5,280.20.

Watertown, N. Y.—Construction of a sanitary trunk sewer in the Second Ward from the Black River to Huntington st., Charlebois Bros., city, \$24,608; Lon B. Cleveland, city, \$23,001; W. S. Selsper, city, \$21,618; C. D. Hodge & Co., city, \$21,275; Philip Thomas, Syracuse, \$20,966; Samuel Bown, Syracuse, \$20,209; Burns Bros. & Haley, city, \$19,343.

Seattle, Wash.—Twenty-third ave. S. et al., sewers: Krogh & Jensen, \$29,790.30; D. McGarry, \$29,806.50; Young & Ulrich, \$29,455.80; T. I. Peterson, 324 24th ave. S., \$27,254.40; Nelson & Carlson, \$30,858.30; Becker & Walker, \$27,577.30; Virginia st. trunk sewer, (a) brick, (b) concrete: Walker & Placky, (a) \$20,245, (b) \$20,245; Hayden & Sons, (a) \$17,391.90, (b) \$17,391.90; Dan McGarry, (a) \$17,172.40, (b) \$16,268.40; Rounds Hurson Co., (a) \$16,121.60, (b) \$17,665.60; A. Peterson, 601 American Bank Bldg., (a) \$16,030, (b) \$16,030; B. H. Graft, Montera P. O., (a) \$17,473.88, (b) \$15,390.60.

WATER SUPPLY

St. Petersburg, Fla.—Plans are being prepared for construction of reservoir, capacity 225,000 gals.—C. B. McClung, Chairman Water Works Committee.

Salmon City, Ida.—Citizens have voted to purchase water works system; \$15,000 will be spent in improvements.

New Athens, Ill.—C. A. Redinger, Chemical Bldg., St. Louis, Mo., is preparing plans for proposed water works; cost about \$28,000.

Auburn, Ind.—City will gradually re-equip present municipal water works and electric light plant.

Evansville, Ind.—Board of Public Works has decided to install water works pump at cost of more than \$10,000.

Indianapolis, Ind.—Council has appropriated \$1,045 for fire cistern.

Monticello, Ind.—Board of Public Works is considering asking for bids for improvement of water works.

Burlington, Ia.—Citizens Water Co. will enlarge filter plant and install additional engine.—E. P. Eastman, President.

Cumberland, Md.—J. H. Fuertes, Expert Hydraulic Engineer, New York City, has made recommendations for bettering water supply; three sources of supply available; eight different plans for plants of 6,000,000 and 12,000,000 gals. capacity; cost from \$402,700 to \$1,082,850.

Cumberland, Md.—Council has adopted plan advanced by Engineer J. H. Fuertes to take water supply from Evitt's Creek; cost of the improvement will be in neighborhood of \$470,000.

Andover, Mass.—Town has voted \$20,000 appropriation for water extension.

Brockton, Mass.—Plan for twin reservoirs, each of 4,000,000 gals. capacity, have been prepared by City Engineer Charles R. Felton.

Tewksbury, Mass.—Citizens have defeated proposition to establish water plant; company will be formed to install system.

Lynn, Mass.—City Engineer George I. Leland is working on plans for extension of storage system for water supply.

Grand Rapids, Mich.—City has awarded \$75,000 water main extension bond issue to Harris Trust Co., Chicago; new bids will be asked for \$20,000 filtration bond issue.

Grand Rapids, Mich.—Bids will be received March 13, 4 p. m., for \$200,000 rapid sand filtration bonds.—Jas. Schurer, City Clerk.

Cole Camp, Mo.—Citizens will vote in April on \$10,000 water works bonds.

Columbia, Mo.—H. B. Shaw, Consulting Engineer, will purchase about 44,000 ft. 6-in. and 14,000 ft. 4-in. c.-i. pipe for water works extensions.

Diller, Neb.—Citizens have voted \$15,000 bonds for the construction of water works.—J. Smith, Village Clerk.

Dundee, Neb.—Citizens have defeated proposition to issue \$49,000 bonds to install independent water plant.

Kensaw, Neb.—Citizens have voted proposed water bonds.

Jersey City, N. J.—Citizens will vote on \$75,000 bonds to improve water and drainage systems.

Las Cruces, N. M.—Council will order election on bonds for construction of water works system.

Tucumcari, N. M.—Citizens will vote April 27 on purchase of water works plant.

Irondequoit, N. Y.—Governor Dix has signed bill legalizing a bond issue of \$20,000 for the construction of water works system at Summerville by this town.

Lyndonville, N. Y.—Citizens will vote March 21 on \$25,000 bonds to install water works.

Portland, N. Y.—Engineer Wilder, Fredonia, has prepared preliminary estimates for water works.

St. Johnsville, N. Y.—Citizens will vote on \$5,000 appropriation to purchase and install system of water works.

Black Mountain, N. C.—Citizens will vote on \$15,000 bonds for construction of water works and sewerage system.

Charlotte, N. C.—Citizens will vote on \$350,000 bonds to bring water from Catawa River, 12 miles distant.

Baker City, Ore.—Estimates will be made on constructing of 3,000,000-gal. capacity reservoir near the present one.

Pendleton, Ore.—Water Commissioners will call election on bonds for installation of gravity water system; mountain water will be piped from the foothills of the Blue Mountains, the source of supply being the Thorne Hollow Springs, 14 miles distant; water will be brought to city in 18-in. pipe for a part of the distance and 20-in. pipe for the remaining distance.

Erie, Pa.—Dr. J. L. Leale, 158 Ellison st., Paterson, N. J., has estimated cost of installing proposed filtration and sterilization plant at \$250,000.

Franklin, Pa.—Consulting Engineer L. E. Chapin, Pittsburg, has recommended \$15,000 appropriation for improvements at water works.

New Kensington, Pa.—State Board of Health has ordered New Kensington Water Co. to submit plans for filtration plant not later than June 1.

Bancroft, S. D.—Election on bonds for installation of water works system is being considered.

Carter, S. D.—Council has decided to construct municipal water system; cost \$7,000.

Morristown, S. D.—Bonds have been voted for construction of water works.—J. Peter Healy, Town Clerk.

Clarksville, Tenn.—Water Committee has recommended improvements to cost over \$50,000, including erection of building for the pumping station to be built above high water and to cost approximately \$12,500; erection of another standpipe, 124 ft. in height; clear water concrete basin; installation of meter throughout city; extension of mains to sections of city not served, and such additional pumps as may be required to supply and protect city.

Maryville, Tenn.—City has petitioned Legislature for authority to issue \$100,000

bonds for construction of water works and sewerage system.

Sherman, Tex.—City has decided to improve water works plant.—Harne McDuffie, Superintendent.

Timpson, Tex.—Citizens will vote on \$20,000 of bonds for construction of water works.

West, Tex.—West Water, Power and Light Co. has decided to erect brick water station.

Salt Lake City, Utah.—City Engineer G. F. McGonagle is preparing plans for construction of additional water system.

Montross, Va.—Citizens have voted \$50,000 bonds to improve water and sewer system.

Seattle, Wash.—Board of Public Works is taking bids on a brick and concrete pumping station to be built at Interbay; plans prepared by City Engineering Department.

Tacoma, Wash.—City is preparing to call for bids for the construction of pipe line from McMillan to Tacoma and of \$100,000,000-gal. reservoir at McMillan.—Victor Lawson, Commissioner of Light and Water.

Frederic, Wis.—Citizens will vote April 4 on \$2,000 bonds to erect 50-ft. steel tower and 20,000-gal. steel tank.

La Crosse, Wis.—City Engineer Geo. P. Bradish has recommended improvements to water distribution system at cost of \$56,298.

CONTRACTS AWARDED

Ontario, Cal.—Constructing domestic water system from plans of F. E. Trask, Homer Laughlin Bldg., Los Angeles; laying pipe, to Joe Chutuk, Los Angeles, \$18,882; screw pipe and specials, Crane Co., Los Angeles, \$70,375; riveted pipe and specials, Western Pipe and Steel Co., Los Angeles, \$16,398.

San Francisco, Cal.—Furnishing, testing and delivering gate and check valves for auxiliary water system for fire protection, to Union Machine Co., \$11,593; furnishing and delivering bolts, tie rods, etc., for same, to Union Iron Works Co., \$106 per ton of 2,000 lbs.

New Haven, Conn.—Furnishing water pipe, to R. D. Wood & Co., \$22.08 per ton; other bidders: U. S. C. I. P. Co., \$22.45 per ton; Standard Pipe Co., \$22.68 per ton; Charles Miller & Son, \$22.70 per ton; M. J. Drummond, \$24.10 per ton; Lynchburg Foundry Co., \$24.50 per ton.

Augusta, Ga.—Furnishing 11,700 lin. ft. c-i. pipe, to the General Pipe and Foundry Co., Atlanta, \$21.75 per ton; other bidders were Dimmick Pipe Co., Chattanooga, \$22.25; American Cast Iron Co., Birmingham, Ala., \$22.50; laying pipe, to Hallahan & Costello, Augusta, 12-in. 33c., 10-in. 25c., 8-in. 25c., 6-in. 18c.; only other bidder for this contract was T. G. Brittingham, Augusta, 12-in. 33c., 10-in. 32c., 8-in. 25c., 6-in. 20c.

Apple River, Ill.—Constructing water works, to T. H. Iglehart, Chicago, \$15,400.

Kingston, Ill.—Construction of water works system, to Bellis & Gale, Oregon, Ill., \$3,855; work includes 1 10-h.p. gasoline engine, 1 4x6-in. compressor, 1 6-in. pump, 1 8x36-ft. pressure steel tank, 3,200 ft. of 4-in. water pipe with 9 hydrants containing two openings, 1 2½-in. and 1 2-in., to be placed at each street crossing.

Logansport, Ind.—Improvements to city water works, including engine, pump and other equipment: Hoovens-Rentschler Co., Hamilton, O., \$15,420; Snow Steam Pump Co., Chicago, Ill., \$17,745; Platt Iron Works Co., Dayton, O., two bids, \$15,500 and \$14,095; Alis-Chalmers Co., Milwaukee, Wis., 2 bids, \$13,995 and \$15,495; Prescott Steam Pump Co., Chicago, Ill., \$16,380.

Adair, Ia.—Water works and electric lighting improvements, to the Des Moines Bridge and Iron Co., Des Moines, \$28,460.—W. K. Palmer Co., Dwight Bldg., Kansas City, Mo., Engineers.

Atlantic, Ia.—Water works and electric lighting improvements, to the Joseph A. Bortenlanger Co., Omaha, Neb., \$43,000.—W. K. Palmer Co., 717 Dwight Bldg., Kansas City, Mo., Engineers.

Iola, Kan.—Installation of three new boilers, to United Iron Works, city, \$6,844.

Wymore, Neb.—Constructing municipal water and lighting plant, to Elkhorn Construction Co., Fremont, laying water mains, \$3,150; to Frank Wheeler, Havelock, Neb., constructing electric line, \$1,150; to St. Mary's Machine Co., Ohio, machines for general power, \$4,250.

Bayonne, N. J.—Laying 10-in. water main in Constable Hook yards of Standard Oil Co., to E. M. Mullen & Co., \$1,157.01.

Perth Amboy, N. J.—Furnishing engine and blower for water works at Runyon, to Engineering Co., \$775; to the same company for balanced draft system in connection with boilers for new pump, \$495.

Rochester, N. Y.—Furnishing stop valves for water works department, to Rensselaer Valve Co., \$540 for larger valves to \$8.20 for smaller sizes.

Canton, O.—To Chicago Bridge and Iron Co., Chicago, Ill., for constructing 1,000,000-gal. reservoir, \$23,200.

Euclid, O.—To Gould & Maybach, Cleveland, for improvement of Montclair road, by constructing a 6-in. water main, \$1,177.—F. A. Pease Engineering Co., 931 Williamson Bldg., Cleveland, Engineer.

Hamilton, O.—To Darling Pump Manufacturing Co., Williamsport, Pa., for 6-in. gate valves at \$11 each, and to Scioto Valley Supply Co., Columbus, for furnishing 4-in. wrought iron gas pipe at \$26.15 and 6-in. pipe at \$47.30 per 100 ft.

Toledo, O.—Furnishing year's supply of water pipe for water works department, to United States Cast Iron & Foundry Co., Chicago, \$22.80 a ton; department will use approximately 1,500 tons during season.

Nashville, Tenn.—Supplying city with 45,000 ft. of 6-in. and 3,000 ft. of 12-in. water pipe, to U. S. C. I. Pipe and Foundry Co., Chattanooga, \$20.95 f. o. b. per ton.

BIDS RECEIVED

Fort Terry, N. Y.—Construction of (a) reinforced concrete reservoir, (b) extension to water main: Sperry Engineering Co., New Haven, Conn., (a) and (b) \$11,110; A. Benvenuti, New London, Conn., (b) \$1,400; Connecticut Engineering and Contracting Co., Norwich, Conn., (a) \$6,750, (b) \$1,050; Francis J. Boas, Philadelphia, Pa., (a) and (b) \$14,300; John J. Fitzpatrick & Sons, Plattsburg, N. Y., \$13,578, (b) \$1,700; Alexander Johnstone Building Corporation, Waterbury, Conn., \$13,772; Amity Construction Co., New York City, \$9,636; F. H. Redden Construction Co., New London, Conn., (a) and (b) \$11,670; R. H. Whipple & Co., Worcester, Mass., (a) and (b) \$10,973; F. H. Schwiers, Jr., Co., New York, (a) and (b) \$12,000; alternate of F. H. Schwiers, Jr., Co., \$11,415; Neil Farnham, Inc., New York, (a) and (b) \$21,980; M. L. Bayard & Co., Philadelphia, Pa., (a) and (b) \$17,000; alternate of M. L. Bayard & Co., \$15,000; Plerson Engineering and Construction Co., Bristol, Conn., (a) and (b) \$12,500.

Coshocton, O.—Construction of either 3,000,000 or a 4,000,000-gal. steam pumping engine or a 3,000,000-gal. centrifugal electrical driven pump for water works department as follows: Platt Iron Works, Dayton, steam, 3,000,000-gal. pump, \$24,715; steam, 4,000,000-gal., \$25,430; each to be completed in six or seven months; 2-unit electric, 3,000,000, \$9,660; 4,000,000, \$10,060; four months on each; Holly Mfg. Co., Buffalo, N. Y., steam, 3,000,000, \$17,980; 4,000,000, \$19,130; each six months; electrical, 3,000,000, \$11,800; Alis-Chalmers Co., Milwaukee, Wis., steam, 3,000,000, \$22,485, 5½ months; 4,000,000, \$26,467, six months; electrical, 3,000,000, \$12,500; American Well Co., Chicago, Ill., electrical, 3,000,000, \$6,237; 4,000,000, \$8,178; each 95 days; Dravo-Doyle Co., electrical, 3,000,000, \$7,700; 4,000,000, \$8,000; each 110 days.

Dallas, Tex.—Erection of the White Rock standpipe, 70 ft. high and 20 ft. inside diameter; bids are for the placing of the foundations of concrete and for the necessary excavations for that work: Dallas Boiler Works, by J. F. Thrash, erection of the standpipe \$4,615, with 45c. per cu. yd. for earth excavations, \$2.50 for rock and \$7.60 for the concrete work; O. J. Gorman, erecting of the standpipe \$5,200, with \$1.680 for foundation work and \$2.60 per cu. yd. for rock excavation; Memphis Steel Construction Co., erecting of standpipe \$4,340, with earth excavation at 30c. per cu. yd., \$1.60 for rock excavation and \$6.60 to \$7 for concrete; F. B. Godley, standpipe erection \$5,559, with \$1 for earth work, \$2 for rock and \$6 for concrete, or a lump sum for the foundation work of \$1,360; Smith & Whitney, erection of the standpipe 5,375, with \$1 for earth work, \$2 for rock and \$6 for concrete, or a lump foundation sum of \$1,350; Chicago Bridge and Iron Works, standpipe erection \$6,795, with rock excavation at \$1 per cu. yd.; as an alternate bid the company offered to erect steel tank holding 165,000 gals., 12 ft. to the first expansion joint and 42 ft. to maximum water line, for \$5,900, with deduction if a valve is used of \$800.

LIGHTING AND POWER

Etna Mills, Cal.—Power house, which is owned by the Scott River Drading Co., which furnishes town of Callahan with light, has been completely destroyed by fire.

Imperial, Cal.—C. S. Chestnut, Redlands, is interested in construction of electric light plant.

Los Angeles, Cal.—Citizens have declared in favor of municipal distribution of electrical power, which will be generated by the 250-mile Owens River aqueduct, as against proposal that it is leased to the existing power corporations.

Porterville, Cal.—The Home Gas Co. has decided to reconstruct plant; high-pressure

line is to be installed to cover entire city.—W. B. Phillips, President.

San Bernardino, Cal.—Lytle Creek Light and Power Co., holder of present lighting contract, has submitted offer to sell their system to the city for the establishment of municipal lighting plant desired by city officials.

Yreka, Cal.—The Siskiyou Electric Power and Light Co. is considering enlargement of plant.—J. W. Churchill, President.

Bridgeport, Ill.—R. D. Donnelly, W. E. Beyhau and V. H. Lytle have incorporated Bridgeport Light and Power Co., capital \$25,000, to furnish light, heat and power.

Waukegan, Ill.—North Shore Electric Co. is planning to erect addition to plant.

Fort Wayne, Ind.—Board of Public Works will within next few weeks receive bids on both tungsten and the magnote systems of illumination for ornamental posts to be installed on Calhoun st.

Terre Haute, Ind.—Citizens Mutual Heating Co. will erect power plant between 5th and 6th sts.; cost \$100,000.

Humeston, Ia.—Leon Electric Light Co. is considering extension to wires to light town.

Jeffersontown, Ky.—Commercial Club and Town Board are interested in formation of company to install \$15,000 lighting plant.

Louisville, Ky.—Kentucky Electric Co. has purchased additional site for erection of proposed \$1,000,000 power plant.

Kensington, Md.—Council will grant to Potomac Electric Power Co., Washington, 35-year franchise; company will extend its lines at once.

Clinton, Minn.—Citizens have decided to install electric light plant either by giving the franchise to private parties or by municipal ownership.

Byhalia, Miss.—Council is considering \$10,000 bond issue to purchase and install electric light and water plants.—C. M. Henry, Mayor.

Malta, Mont.—H. E. Wharton has asked Council for franchise to install electric light plant.

Franklin, Neb.—City proposes to construct electric light plant to cost \$7,000 to \$8,000.—H. Whitmore, City Clerk.

Gordon, Neb.—Citizens have voted bonds for installation of electric light, sewer and water works systems.

Cape May Court House, N. J.—The Wildwood, Anglesea and Holly Beach Gas Co. has been granted right to lay mains through streets of Cape May Court House and leading highways of Middle Township.

Columbus, N. J.—Township Committee is considering proposition to light village with gas.

New York, N. Y.—Public Service Commission, Second District, has received application from the Long Island Lighting Co., a new corporation, asking for its approval of the purchase of entire property and franchise of the Amityville Electric Light Co., the Sayville Electric Co., the Northport Electric Light Co. and the Islip Electric Light Co., and their merger into the Long Island Lighting Co.; new construction, additions and betterments to the amount of practically \$300,000 are proposed.

Richville, N. Y.—Village will vote March 21 on proposition of raising money to light streets.

Hankinson, N. D.—H. G. Squires, Galesburg, Ill., has applied for franchise to operate electric light plant.

Minot, N. D.—Burns & McDonnell, Kansas City, Mo., are investigating feasibility of installing municipal electric light plant.

Mott, N. D.—Council has granted 20-year franchise to J. Blaine Little for operation of an electric light plant.

Brookville, O.—Bids are now being received by village for electric power, commercial and street lighting.—H. E. Wheaton, Corporation Clerk.

Cleveland, O.—The Star Electric Co. has been organized, capital \$10,000, to furnish electric current for lighting and power purposes.—D. H. Tilden, A. A. McCorkin, Marjorie Ferrall, J. M. Brug and Elmer G. Derr, Incorporators.

Albany, Ore.—Electric Light Co. will expend \$100,000 in improving light and water systems.

Baker City, Ore.—City Commissioners have decided that under Commissioner Henry, City Engineer prepare estimates for pipe line from Elk Creek to Salmon Creek to replace flume now in; pipe line is to furnish power for electric lighting plant to be owned by city and the City Engineer was also instructed to estimate cost of such plant.

Salem, Ore.—Council is making arrangements for establishing cluster system if illuminating streets.

Hamburg, Pa.—Electric light plant has been destroyed by fire; loss \$10,000.—Morgan Ford, Engineer.

Lock Haven, Pa.—Council has instructed Light and Sanitary Committee to ask for bids for lighting streets by electricity; also

for bids for construction of electric plant to be owned and operated by city.

Dillon, S. C.—Electric Light Commission has decided to rebuild electric light plant.

Honea Path, S. C.—Council is considering \$11,000 bond issue for construction of electric light system.

Draper, S. D.—Council will grant 25-year franchise for installation of electric light plant.

Jackson, Tenn.—City will expend nearly \$20,000 for improving lighting system.

Lynnville, Tenn.—Board of Aldermen is considering application for franchise for construction of electric light and ice plant.

Memphis, Tenn.—Mayor Crump and Commissioner of General Utilities Thomas Dies are preparing to leave for Seattle, Washington, Portland, Detroit and Cleveland to investigate municipal lighting plants as a preliminary step toward establishing municipal lighting plant in this city.

Baird, Tex.—T. A. Ward, Comanche, has decided to construct electric light system.

New Braunfels, Tex.—The W. K. Palmer Co., Engineers, 717 Dwight Bldg., Kansas City, Mo., will prepare plans for installation of proposed municipal hydroelectric plant.

Ogden, Utah.—Engineer Strauss is preparing plans for proposed electric power plant to be constructed by Merchants Light and Power Co.

Olney, Va.—Peninsula Light and Power Co. has been incorporated by Thomas R. James, B. W. James, W. C. Fox, W. J. Milliner and R. S. Milliner to construct electric light plant.

Seattle, Wash.—Bids on Subdivision No. 1 of the Third ave. cluster light contract have been rejected by the Board of Public Works upon the recommendation of Assistant City Engineer Dimock; bids were on clearing, excavation, hand holes, concrete walks, iron pipe, fibre pipe and secondary cable; low bidder was Meacham & Babcock at \$20,157.80; new bids will be called for.

Albany, Wis.—Electric light plant has been destroyed by fire.

Beloit, Wis.—Council has taken steps to order all downtown telephone and electric light wires underground.

Racine, Wis.—Plant of Racine Electric Light and Railway Co. has been destroyed by fire with loss of \$125,000.

Superior, Wis.—Great Northern Power Company has issued call for bids for supplying apparatus that will be needed in construction of new electric transmission line from power plant at Thompson to Superior.

Sun Prairie, Wis.—Citizens have voted \$9,000 bonds for installation of electric light system.

CONTRACTS AWARDED

Willows, Cal.—Erecting 20,000-ft. gas holder for Northern California Power Co. to Davis & Farnum Manufacturing Co., Waltham, Mass.

Dalton, Ga.—By Council, for extension of electric light system, to John W. Ash, Austell, for reinforced concrete power house, electric light and pumping station, etc., \$16,500.—H. S. Jaudon Engineering Co., Box 582, Savannah, Engineer in Charge; W. M. Carroll, City Clerk.

East St. Louis, Ill.—To East St. Louis Light and Power Co. for furnishing 100 additional electric arc lights, \$50 per light.

Staunton, Ill.—To Wesco Supply Co., St. Louis, Mo., for installation of electrical apparatus in municipal electric light plant, \$6,725.

Adair, Ia.—Electric lighting and water works improvements, to Des Moines Bridge and Iron Co., Des Moines, \$28,460.—W. K. Palmer Co., 717 Dwight Bldg., Kansas City, Mo., Engineers.

Atlantic, Ia.—Electric lighting and water works improvements, to the Jos. A. Bortelanger Co., Omaha, Neb., \$43,000.—W. K. Palmer Co., 717 Dwight Bldg., Kansas City, Mo., Engineers.

Baltimore, Md.—Furnishing gas for municipal lighting for one year, to Consolidated Gas, Electric Light and Power Co., 70c. per 1,000 cu. ft. for street lighting and 80c. for lighting municipal buildings.

Newton, N. J.—By Newton Gas and Electric Co. for constructing new plant, to O'Donnell & McNamian, Newton; cost about \$15,000.

Yonkers, N. Y.—Lighting streets for five years, to Westchester Lighting Co., \$28 per lamp.

Swansea, R. I.—Town has voted appropriation of \$1,000 a year for five years for erection and maintenance of a public street light system and voted to empower Board of Selectmen to execute contract with the Fall River Electric Light Co. to furnish electrical current and equipment.

FIRE EQUIPMENT

Texarkana, Ark.—Council has rejected all bids for furnishing auto fire apparatus.

Berkeley, Cal.—Citizens have voted \$85,000 bonds for fire department; three fire houses will be erected, fire house on Durant rebuilt and modern equipment purchased.

Willows, Cal.—Trustees have sold \$40,000 bonds for purchase of fire apparatus and site for city hall to E. H. Rollins & Co.

Fort Tampa, Fla.—Volunteer fire department will be organized.

St. Petersburg, Fla.—City will erect proposed fire house at 3d st. and 2d ave. South.

East Freeport, Ill.—Need of auto hose cart is being urged.

Goshen, Ind.—Council has decided to erect proposed central fire station at 3d and Jefferson sts.

Indianapolis, Ind.—Board of Public Works is considering plans prepared by Architects H. L. Bass & Co. for erection of three engine houses.

Newcastle, Ind.—Council will erect \$8,000 engine house at South 18th st. and Grand ave.

Hammond, La.—Purchase of motor chemical engine is being considered.

Searsport, Me.—Town has voted \$250 for hose and authorized Selectmen to purchase rubber coats for firemen.

Hyattsville, Md.—Town is about to erect fire department and municipal building.—J. Frank Rushe, Fire Chief.

Gloucester, Mass.—Council is considering purchase of auto chemical combination wagon. Address Chief Engineer Crowe.

Marblehead, Mass.—Town has appropriated \$9,000 to install larger fire alarm switchboard.

Monson, Mass.—Town will consider purchase of auto truck.

Newburyport, Mass.—Town will remodel engine at cost of \$1,300 and purchase 3,000 ft. of hose.

Rockport, Mass.—Town has voted to appropriate \$800 for purchase of fire hose.

Saugus, Mass.—City proposes to build fire station to cost \$20,000, also to spend \$2,500 for truck, \$1,200 for four horses, \$5,500 for auto combination wagon and \$1,000 for fire alarm extension.

Southbridge, Mass.—Fire department is urging need of 1,000 ft. of hose.

Grand Rapids, Mich.—Board of Fire Commissioners has recommended that motor-driven apparatus be installed at No. 1 engine house.

Duluth, Minn.—Oneota Improvement Club is urging erection of fire house and establishment of combination hose and chemical wagon.

Stephen, Minn.—Chief Jacob Peters is securing data on chemical engines.

Benson, Neb.—Citizens have voted \$5,000 bonds to purchase of fire apparatus.

Hempstead, N. H.—Town has organized fire department with H. W. Tabor as captain; purchase of chemical fire engine is being considered.

Manchester, N. H.—Board of Mayor and Aldermen of Council has asked for appropriation of \$6,000 for auto chemical to be stationed at the Fire King.

Morristown, N. J.—Fire Chief Trowbridge has recommended purchase of auto truck.

Ocean City, N. J.—Council has ordered purchase of 1,500 ft. of hose for fire department.

Paterson, N. J.—Board of Fire and Police Commissioners will ask bids for the converting of engines and hose wagons of steamer companies Nos. 1 and 5 to motor-propelled engines, and also for purchase of a motor hook and ladder truck.

Phillipsburg, N. J.—Council is considering purchase of chemical fire engine.

Clayville, N. Y.—Village will vote March 21 on \$1,500 bonds to erect engine house.

Hamburg, N. Y.—Fire Chief John Salisbury has recommended erection of fire station and purchase of 1,000 ft. of hose.

Little Falls, N. Y.—Fire and Police Board has asked permission to purchase hose wagon.

Mamaroneck, N. Y.—Citizens will vote March 21 on \$12,500 bonds to erect fire station.

Marathon, N. Y.—Village will vote March 21 on purchase of chemical fire engine; option has been obtained on suitable engine at price of \$665.

Niagara Falls, N. Y.—Taxpayers will vote in April on proposition to expend \$42,500 for two new fire halls, three pieces of automobile apparatus, and for protecting fire alarm system from injury by fire.

Pelham Manor, N. Y.—Citizens will vote on \$10,000 appropriation for purchase of motor fire engine.—J. Lewis Cunningham, Fire Chief.

Port Leyden, N. Y.—Citizens will vote on \$350 appropriation for chemical engine.

St. Johnsville, N. Y.—Citizens will vote on \$500 appropriation for fire alarm system.

Utica, N. Y.—Plans have been prepared by Architect Hobbes for erection of \$15,000 fire station at Elizabeth st. and Post ave.

Cincinnati, O.—Safety Director Small, Mayor Schwab and Fire Chief Archibald have decided on extensive improvements and additions to fire department, including installation of three auto fire engines and several auto combination hose and chemical engines.

Marietta, O.—Plans have been prepared for erection of house for Hose Co. No. 1.

Warren, O.—Council has passed bond ordinance for \$4,500 with which auto fire truck will be purchased for central department.

Chester, Pa.—Good-Will Fire Co. is planning to erect addition to engine house.

Erie, Pa.—Fire Commissioners have asked Council for \$20,000 appropriation for purchase of apparatus.

Hazleton, Pa.—Fire Chief Thos. Burkhart has recommended purchase of triple auto, engine, chemical and hose fire apparatus to be stationed at central station, also two auto combination chemical engine and hose wagons.

Meadville, Pa.—Need of auto truck for Davis Hose Co. is being urged.

Pittstown, Pa.—Town has appropriated \$5,000 to erect fire station.

Providence, R. I.—Fire Commissioners have recommended gradual substitution of motor-driven apparatus for horse-drawn.

Sumter, S. C.—Committee, Alderman J. F. Glenn, Chairman, is considering need of auto apparatus.

Puyallup, Wash.—George Barry, Chief Fire Department, is in favor of city purchasing combination automobile chemical hose and hook and ladder wagon and of having up-to-date fire alarm system installed.

Tacoma, Wash.—City will purchase site at E. 26th and C sts. for erection of fire station.

Tacoma, Wash.—Municipal Committee has voted to purchase fire engine for station at N. 25th and Proctor sts., type, size and cost not yet determined.—L. W. Roys, Commissioner.

Beloit, Wis.—Council has ordered overhauling of fire alarm system and installation of 11 new boxes at cost of \$1,500.

CONTRACTS AWARDED

Pueblo, Col.—Furnishing auto fire truck, to American-La France Fire Engine Co., Elmira, N. Y., \$5,750.

Millville, N. J.—Eureka Fire Hose Manufacturing Co., 13 Barclay st., New York, has been awarded contract for 500 ft. of two-ply fire hose, \$1.00; company informs us that item in issue of March 8 stating that Paragon hose was furnished was in error.

Hazleton, Pa.—Furnishing auto chemical engine for Diamond Fire Co., to Robinson Fire Apparatus Co., St. Louis, Mo.

Columbia, S. C.—Furnishing auto hose wagon and chemical engine and automobile fire engine, to Webb Company and American La France Company combined, price being \$13,000.

BRIDGES

Macon, Ga.—Bibb County will vote May 10 on \$200,000 bonds for bridge improvements and new bridges.

East Peoria, Ill.—Village Board has voted to advertise for bids preparatory to erection of concrete bridge over Coles Creek at Washington st.; cost about \$4,000.

Moline, Ill.—Plans have been completed by Landscape Architect Henry C. Klehm, Arlington Heights, for erection of \$1,500 concrete bridge over West Lake.

Mt. Vernon, Ind.—County Council has appropriated \$20,000 for bridge and road construction in Posey County.

Washington, Ind.—Council is considering plans and specifications by Hugh O'Neill for construction of proposed bridge at North East 1st st.

Holyoke, Mass.—Board of Public Works has instructed City Engineer to submit estimates for bridge over second level canal at Cabot st.

Benton Harbor, Mich.—City is considering construction of a viaduct to connect East and West High sts.; preliminary plans have been prepared, providing for structure 825 ft. long and 28 ft. wide, with 4-ft. sidewalks and 20-ft. roadway.

Taylor's Falls, Minn.—L. P. Wolff, St. Paul, is preparing plans for bridge to be constructed over St. Croix River.

Omaha, Neb.—Plans have been prepared for erection of proposed 11th st. viaduct; cost \$100,000.—Geo. Craig, City Engineer.

Passaic, N. J.—Freeholders of Passaic and Bergen counties are considering erection of \$75,000 bridge across Passaic River at Rutherford ave.

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Cuban Refined Asphalt has been in successful use for many years in street pavements in our largest cities.

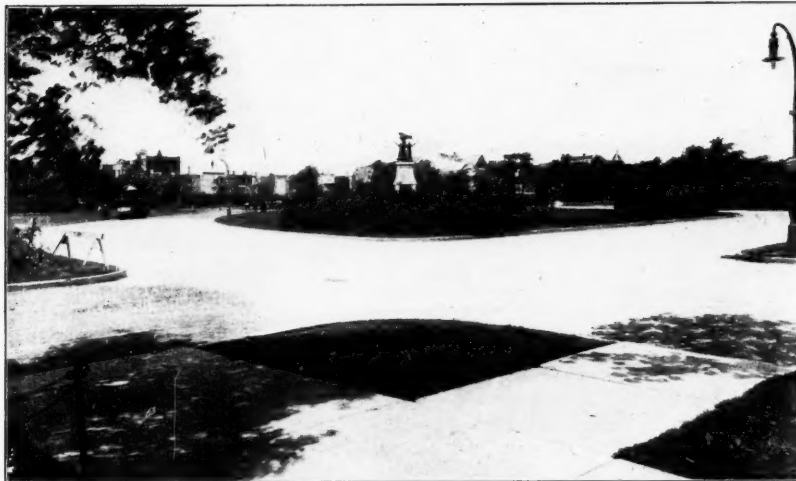
Cuban Asphalt Pavements have been put to the severest tests and have proven superior to other materials in durability, sanitation and economy.

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Cubanel Asphalt Binder makes a smooth, lasting and dustless road that will wear longer and look better than any other material.

Cubanel Roads possess great ductility and unusual pliability which in cold or hot weather is a distinctive feature of our material that greatly reduces the cost of maintenance.

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SAMPLES SENT ON REQUEST

Cuban Refined Asphalt and Cubanel Asphalt Road Binder

Conform in every particular to the requirements of the specifications adopted by the Organization of City Officials for Standardizing Paving Specifications, New York City, January, 1911.

International Asphalt Company

Chamber of Commerce Bldg., :: CHICAGO

La Salle, N. Y.—Citizens have voted \$3,500 appropriation to build bridge across Cayuga Creek.

Cincinnati, O.—Council has passed \$250,000 bond issue for construction of the Gilbert ave. viaduct.

Altoona, Pa.—Board of Public Works has adopted plans for proposed 7th st. bridge.

Reading, Pa.—Berks County will erect three new bridges this summer at Mohnton crossing the Wyomissing road.

Reading, Pa.—Berks County has approved plans for new bridge across Schuylkill at Penn st, which call for five main spans of 110 ft. each and nine approach spans of 48 ft. each.

West Chester, Pa.—Commissioners of Chester County have decided to build bridge over Doe Run Creek, near Springdale.

North Kingston, R. I.—Towns of East Greenwich, Warwick and North Kingston have practically agreed on plans and specifications for erection of bridge over Hunt River.

Angleton, Tex.—Brazoria County will vote April 4 on \$100,000 bridge bonds.

Salt Lake City, Utah.—House has passed bill appropriating \$35,000 for erection of bridge over Grand River near Moab.

Ashland, Va.—King William and Hanover County Supervisors have decided to build bridge across Pamunky River at Hanover town at cost of \$4,000.

Morgantown, W. Va.—County Court is considering erection of bridge across Deckers Creek at Bridge st.

Grand Rapids, Wis.—Petition is being circulated to replace bridge, connecting east and west sides of city, with substantial structure, wide enough to permit street car line to pass over.

MISCELLANEOUS

Berkeley, Cal.—Citizens have voted \$200,000 bonds for playgrounds and \$300,000 for purchase of park sites; also \$150,000 for police.

Los Angeles, Cal.—City Engineer Homer Hamlin has prepared plans for dredging in Wilmington Harbor; bids will be asked soon.

Washington, D. C.—Consul John J. Wood, Tripoli, in Barbary, has reported that steam roller will soon be needed for proposed improvements. Address No. 6344, Bureau of Manufactures.

Kissimmee, Fla.—Erection of county jail is being considered by Osceola County.

Augusta, Ga.—City will erect \$125,000 hospital.

Macon, Ga.—Bibb County will vote May 10 on \$75,000 bonds for court house improvements.

Richmond, Ind.—Board of Public Works

is considering improvements at Glen Miller Park.

Spiceland, Ind.—Two-story town hall will be built.

Hyattsville, Md.—Town is about to erect municipal and fire department building.

Oak Bluffs, Mass.—Town has voted \$2,000 for improvement of Lake Anthony Harbor.

Salem, Mass.—City Electrician Ashby is preparing plans for placing municipal fire alarm, police and telephone wires in conduits at estimated cost of \$40,000; about six miles of cable will be required.

St. Paul, Minn.—Bids will be received April 1 for \$25,000 public playground bonds. Address City Comptroller Farnham.

Leeds, Mo.—Board of Public Welfare is considering erection of \$50,000 house of correction.—Wm. Volkner, President.

Newark, N. J.—Senate has passed unanimously bill designed to authorize Board of Freeholders of Essex County to issue bonds not exceeding \$160,000 for extending its park system.

Newark, N. J.—Police Board is considering erection of building of Sixth Precinct Station.

Newark, N. J.—East Side Public Bath Association is urging establishment of public bath in eastern section of city.

Ocean City, N. J.—Council has decided to build pavilion along boardwalk in vicinity of 15th st.

Paterson, N. J.—Board of Public Works is considering resolution to ask for bids for cleaning permanently improved streets.

Perth Amboy, N. J.—Board of Aldermen has instructed Police Committee to procure estimates for new patrol wagon or ambulance with two horses.

Brooklyn, N. Y.—Charles S. Voorhees, 177 Montague st., will prepare plans and specifications for proposed boardwalk to be constructed for Greater Coney Island Co. at Coney Island.

Niagara Falls, N. Y.—City Engineer F. S. Parkhurst, Jr., and Corporation Counsel F. G. Anderson will prepare separate specifications for garbage and ashes collection for purpose of letting contracts at earliest possible time.

Rochester, N. Y.—Bids will be received by Board of Contract and Supply for street cleaning for year; streets will be advertised in 13 groups; about 600 streets will be cleaned.

Rutland, N. D.—Plans are being considered for erection of village hall.

Akron, O.—Bids will be received in about two weeks for erection of \$7,000 comfort station at Main and Martin sts.—John Gauthier, Director of Public Service.

Dayton, O.—Safety Director Leinesch has asked Council to appropriate \$1,400 for purchase of four additional motorcycles for Police Department.

Youngstown, O.—Park Commissioners

are considering improvements to various parks.

Lebanon, Pa.—Council is considering purchase of police patrol.

Pittsburg, Pa.—Finance Committee of Councils has affirmatively recommended Mayor Magee's proposition to build combination city hall and market house on Diamond Square.

West Chester, Pa.—Council has purchased site on South High st. for erection of \$15,000 city hall.

Newport, R. I.—Board of Health will recommend that immediate action be taken by Council to secure erection of modern plant for the sanitary disposal of household waste; crematory system is favored.

Pawtucket, R. I.—Committee on Health will at once let contract for disposing of swill and offal; \$3,675 available.

Brookings, S. D.—Council is considering erection of \$20,000 city hall.

Huron, S. D.—Beadle County will erect \$5,000 building at fair grounds.—Geo. Issenuth, Architect.

Crewe, Va.—Board of Supervisors is considering plans for remodeling jail at cost of \$3,750.

Richmond, Va.—John P. Branch will erect and equip public bath house in western section of city.

Seattle, Wash.—Citizens have voted \$800,000 bonds to construct and operate municipally owned street railway.

Seattle, Wash.—Architects Bebb & Mendel, Denny Bldg., have prepared plans for erection of \$10,000 bathhouse at Alke Point for Seattle Park Board.

Huntington, W. Va.—Council is considering erection of crematory along East State st.

CONTRACTS AWARDED

Waterbury, Conn.—Collecting garbage, to W. C. Hungerford, Oakville, Hans Rasmussen, Henry Schildgren, Union City, and F. P. Clough, Bunker Hill, in their respective sections; city is divided into four sections.

Jacksonville, Fla.—Furnishing summer uniforms for firemen, to S. C. Till, 120 Main st.

Omaha, Neb.—Construction, complete, together with installation of machinery, of crematory building and garbage crematory, to Morse Boulder Destructor Co., 39 Cortlandt st., New York, \$3,680.

Rensselaer, N. Y.—Cleaning streets, to George L. Wiltse, \$1,569; cleaning of catch basins, to Wanmer & Parsons, \$2.49 for each basin.

Rochester, N. Y.—Augustine st. snow cleaning, to Geo. Bantel's Sons.

Dallas, Tex.—Erecting pavilion and bandstand in Forest Park, to Alex. Watson, \$1,675.

TOO LATE FOR CLASSIFICATION

BIDS ASKED FOR

STATE	CITY	RECEIVED UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
STREET IMPROVEMENTS				
Washington...	Seattle.....	Mar. 17, 10 a.m.....	Grading and curbing Fifth Ave. Northwest and other streets; paving McClellan and other streets.....	C. B. Bagley, Secy. Bd. Pub. Wks.
Minnesota.....	Jeffers.....	Mar. 17, 8 p.m.....	Bldg. 12,000 ft. cement sidewalks and 5 crossings.....	J. W. Shaw, Recorder.
New York.....	Yonkers.....	Mar. 20, 3:30 p.m.....	Furnishing 8,000 cu. yds. trap rock.....	Jas. V. Mahony, Secy.
Iowa.....	Sioux City.....	Mar. 25, 9 a.m.....	Paving portion of First Street with brick block.....	E. O. Wesley, Supt. Streets.
Texas.....	Galveston.....	Mar. 27, 11 a.m.....	Grading, regrading and paving road from La Marque to Texas C.....	John M. Murch, County Auditor.
Washington.....	Spokane.....	Mar. 29.....	Paving with asphalt macadam about 15 miles of Apple Way.....	County Commissioners.
Ohio.....	Toledo.....	Mar. 31, 10 a.m.....	Furnishing macadam material for repair of Stone Road No. 33.....	Chas. J. Sanzenbacher, Co. Au.
North Dakota.....	Grafton.....	Apr. 3, 6 p.m.....	Constructing sidewalks and cross walks for the year.....	J. H. Johnson, City Auditor.
Ohio.....	Cincinnati.....	Apr. 7, noon.....	Repairing Lick Run road.....	Stanley Struble, Pres. Bd. Co. Trs.
Oklahoma.....	Lawton.....	Apr. 10.....	Paving approximately five miles, rock asphalt base, wearing surface, concrete curb and gutter.....	Z. M. Scifres, City Engr.
Iowa.....	Cresco.....	Apr. 10, 8 p.m.....	Constructing 5,500 ft. cement concrete curbing and 11,500 sq. yds. cement concrete paving.....	John E. Peck, City Clerk.
SEWERAGE				
Massachusetts...	Medford.....	Mar. 20, 4 p.m.....	Furnishing about 13,000 ft. vitrified salt glazed sewer pipe.....	Allison M. Stickney, Chm. W. & S.C.
Minnesota.....	Virginia.....	Mar. 21, 8 p.m.....	Constructing a sanitary sewer in District 3K.....	Albert E. Bickford, City Clerk.
WATER SUPPLY				
Massachusetts...	Medford.....	Mar. 20, 4 p.m.....	Furnishing about 130 tons of cast iron water pipe.....	Allison M. Stickney, Chm. W. & S.C.
BRIDGES				
Indiana.....	Vincennes.....	Apr. 8, 10 a.m.....	Constructing 3 bridges in Knox County.....	John T. Scott, Aud. Knox Co.
LIGHTING AND POWER				
Washington.....	Seattle.....	Mar. 17, 10 a.m.....	Complete system of cluster lights in various streets.....	C. B. Bagley, Secy. Bd. Pub. Wks.
Ohio.....	Madisonville.....	Mar. 28, noon.....	Furnishing 1 direct connected engine and generator, 100 K.W. 125 K.V.A., 2,300 volts, 3-phase, 60 cycles, 150, 250 or 277 R.P.M.....	Wm. H. Blaney, Clk. Bd. Puv. Aff.
FIRE EQUIPMENT				
Minnesota.....	Coleraine.....	Mar. 20, 8 p.m.....	Installing a 14-box fire alarm system.....	W. J. Stock, Village Clerk.
Pennsylvania...	Lebanon.....	Mar. 27.....	Furnishing a chemical fire engine.....	Chas. T. Hickernell, Pres. Vol. Fire C
MISCELLANEOUS				
New York.....	Yonkers.....	Mar. 20, 3:30 p.m.....	Furnishing teams and labor for unloading 8,000 cu. yds. broken stone from scows.....	James V. Mahony, Secy. B.C. & S.
Pennsylvania...	Carnegie.....	Mar. 24, 7:30 p.m.....	Collecting and disposing of garbage for one year.....	George W. Boden, Chm. B. P. Com
Kansas.....	Salina.....	Mar. 27, 8 p.m.....	Constructing city hall and jail annex buildings.....	Chas. E. Banker, City Clerk.
Wisconsin.....	Green Bay.....	Mar. 29.....	Constructing jail and sheriff's residence.....	Foeller & Schober, Architects.



**CORINTHIAN
STANDARD**

Design Patent 39759

THE BLAZING GLARE

of the flames in the
terrible Minneapolis fire
of last month did not
and could not affect the

CORINTHIAN STANDARDS

altho the store fronts,
beams, girders and side
walks were completely
demolished. The lamp
posts stood their ground.

MERIT WILL OUT

Write Dept. 7D. We will tell you
some interesting things.

**FLOUR CITY
ORNAMENTAL
IRON WORKS**

MINNEAPOLIS, MINNESOTA

STREET IMPROVEMENTS

Auburn, Cal.—Trustees have decided to advertise for bids for putting Railroad st. on grade at junction of High st.; includes cutting down of hill on street, removing trees and widening streets; improvements will cost city \$1,200.

East St. Louis, Ill.—Board of Local Improvement has ordered City Engineer Crocken to prepare estimate of cost of improving Twenty-fifth st.

Mt. Vernon, Ind.—County Commissioners have ordered gravel road election in Smith Township held on April 15.

Muncie, Ind.—County Commissioners have decided on paving of Broadway in Whitely with brick at cost of \$36,000.

Hugo, Okla.—Council has passed resolutions ordering nearly two miles of streets paved; bids will be advertised for at once.

Paris, Tex.—Citizens have voted \$25,000 bonds for paving public square.

CONTRACTS AWARDED

Stockton, Cal.—Improving Lafayette road, distance 9 miles, from Eight Mile House to Acampo, to Cyrus Moreing & Sons, \$45,197.50; Cotton Brothers for improving road from Ripon to the Stanislaus County line, \$4,000.

El Paso, Tex.—Paving West Franklin st. to Texas Bitulithic Co.

Spokane, Wash.—By Board of Public Works to Jas. H. Flife, with granitoid concrete Bernard st., estimate \$36,900, \$37,500; R. S. Blome & Co. bid \$41,200. Boone ave. with granitoid concrete, estimate \$11,600, at \$11,744; Blome bid \$12,600; Lincoln st. with granitoid concrete, estimate \$15,800, at \$15,800; Blome bid \$17,000; Wall st. with asphalt macadam, estimate \$52,000, at \$57,000; Seventh ave. with granitoid concrete, estimate \$12,000, at \$12,200; Blome bid \$13,100.

SEWERAGE

Columbus, O.—Citizens will vote in Fall on \$250,000 bonds for sewers for Grogan and Milo.

New Berlin, O.—Citizens will vote April 22 on \$85,000 bonds to install sewage system and water-works.

Eugene, Ore.—Citizens will vote in April on \$28,000 bonds for construction of two trunk sewers.

CONTRACT AWARDED

Dallas, Tex.—Building sewers on four avenues to C. W. Olcott, \$5,448.

WATER SUPPLY

New Berlin, O.—Citizens will vote Apr. 22 on \$35,000 bonds to install water-works and sewage system.

Caldwell, Tex.—Citizens have voted bonds for erection of \$100-ft. steel standpipe.

CONTRACTS AWARDED

Ft. Bayard, N. M.—To J. H. Harlan, City, for installing two pumps for water system, \$2,335.

Dallas, Tex.—Erecting standpipe for Whit Rock line to Memphis Steel Construction Co., \$5,726.80.

LIGHTING AND POWER

Redding, Cal.—Supervisors have granted franchise to Siskiyou Light & Power Co. to construct pole line along the county highways outside of incorporated cities.

Evansville, Ind.—Construction work will begin not later than Apr. 1 on \$148,000 addition to Evansville Gas & Electric Light Co.'s electric power station at Main and Division sts.; new 2,000-kw turbine generator will be installed and provision will be made for another battery of boilers.

Minneapolis, Minn.—By spending \$50,000 for equipment city can light 20 miles of streets with electricity generated at city crematory plant, according to estimate submitted to Health and Hospitals Committee by J. W. Allan, Smoke Inspector, and Dr. P. M. Hall, Health Commissioner.

Afton, N. Y.—Citizens will vote Mar. 21 on \$8,000 bonds to install municipal electric light system.

Newberry, S. C.—Southern Power Co. has been granted franchise; substation will be erected at once on south fork of Scott's Creek.

Roslyn, Va.—Roslyn Electric & Gas Co. will furnish electricity for light and power to Alexandria County.—Douglas Mackall, President.

Brooklyn, Wis.—Plans are now being considered for installation of model electric light plant; it is planned to have a system which will furnish power 24 hours in day and is designed to take special advantage of low-voltage tungsten lamps.

PROPOSALS

BRICK PAVING

Poughkeepsie, N. Y.

On March 21, 1911, specifications and plans for about 13,000 square yards of brick pavement will be ready for delivery. Bids will be received at the regular meeting of the Board of Public Works of the City of Poughkeepsie, N. Y., at 4 P. M., Thursday, March 30, 1911.

This is the first pavement letting of the season. Additional information may be obtained from

ROBERT J. HARDING,
Superintendent of Public Works.

STREET PAVING

Red Oak, Iowa.

Sealed proposals for approximately six thousand (6000) cubic yards of grading in cut, twenty-five thousand, four hundred and eleven (25,411) yards brick block paving, three thousand, three hundred and twelve (3312) yards of concrete paving, nine thousand, three hundred and sixty-eight (9368) feet of curb and gutter and six hundred (600) feet of straight curb will be received by the City Clerk of the City of Red Oak, Iowa, up to ten o'clock A. M. on the 15th day of March, 1911, at which time the proposals received will be opened and will be acted upon at eight o'clock P. M. the same day. City Council reserves the right to reject any or all bids. Plans and specifications can be had by writing the City Clerk of Red Oak, Iowa.

RICHARD ROBERTS,
City Clerk.

CAST-IRON WATER PIPE

Lewistown, Montana.

Bids will be received by the City of Lewistown, Montana, up to 8 o'clock p. m., March 24th, 1911, for the furnishing of approximately 50,000 feet of cast-iron pipe of 130 lbs. pressure.

Specifications may be inspected at the office of the Municipal Journal and Engineer, and blank form of bid and specifications, or other information, obtained from

P. A. CHASE,
City Clerk, or
O. F. WASMANSDORFF,
City Engineer.
(1, 8, 15, 22)

FIRE EQUIPMENT

Santa Monica, Cal.—Fire Commission is urging purchase of auto fire truck.—Earl P. Nittinger, Fire Chief.

Hammond, La.—Council is considering purchase of motor-driven chemical engine and hose wagon.

Gloucester, Mass.—Alderman Montgomery is urging purchase of \$5,500 auto combination wagon.

Northampton, Mass.—Fire Chief Chase will ask for purchase of \$5,500 auto combination wagon.

Sterling, Mass.—Town will purchase fire extinguishers at cost of \$600.

BRIDGES

Coeur D'Alene, Ida.—Erection of \$18,000 bridge at St. Maries is being considered.

Evansville, Ind.—County Commissioners have ordered construction of three bridges.

Alexandria, La.—Bond issue for bridge and road building is being considered.

Hugo, Okla.—Citizens will vote Apr. 18 on \$120,000 bonds for construction of 21 bridges.

Espanola, Wash.—Citizens have appropriated \$2,000 as bridge fund.

CONTRACT AWARDED

Mt. Vernon, Ind.—Construction of 20 bridges in various sections of the county: To Vincennes Bridge Co., 12, total cost, \$4,689; to S. A. Gano, 2, total cost, \$989; to Greensburg Iron Co., 2, total cost, \$1,028; to Henry W. Eigenmann, 3, total cost, \$1,280; to Mt. Vernon Construction Co., 1, \$275.

PROPOSALS

BRICK PAVING

Dublin, Ga.

Sealed bids will be received until noon, April 18, 1911, by the Mayor and Council of the City of Dublin, Ga., for furnishing material and labor necessary to pave approximately 6,000 square yards of street with vitrified brick.

Plans and specifications, with blank proposal forms, may be seen at the Office of the City Clerk, Dublin, Ga.

The City reserves the right to reject any and all bids.

A. P. HILTON,
Clerk.
M. J. GUYTON,
City Engineer.

(22, 29, Apr. 5)

SEWER SYSTEM

Indianola, Iowa.

Bids will be received by W. A. Graves, City Clerk, at his office in Indianola, Ia., up to (7) seven o'clock P. M., on the 29th day of March, 1911. For the furnishing of all the material and labor, the laying and fully completing a sewer system in North Indianola, according to the plans and specifications on file with the City Clerk consisting of approximately:

175 feet 12-in. vitrified sewer pipe.
7,881 feet 10-in. vitrified sewer pipe.
12,176 feet 8-in. vitrified sewer pipe.
3,204 feet 6-in. vitrified sewer pipe.
together with all the necessary specials.

Bids will also be received by the City Clerk, at the same time and place for the erection of a settling tank, together with all the accessories, including a sludge bed 30 x 50 ft.

Bids will also be received at the same date for furnishing and laying approximately 470 feet of 30-inch vitrified storm sewer pipe, in connection with the disposal plant. And for the erection of two retaining walls of reinforced concrete.

Plans and specifications for all the above work may be seen at the office of the City Clerk, or at the office of the Engineer.

Done by order of the City Council of the City of Indianola.

A. H. GILLILAND, C. E.,
Engineer.

HYDRANTS, VALVES AND SUPPLIES

Lewistown, Montana.

Bids will be received by the City of Lewistown, Montana, up to 8 o'clock p. m., March 24th, 1911, for the furnishing of fire hydrants, valves, lead, jute and other materials.

Specifications may be inspected at the office of the Municipal Journal and Engineer, and blank form of bid and specifications, or other information, obtained from

P. A. CHASE,
City Clerk, or
O. F. WASMANSDORFF,
City Engineer.

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